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ABSTRACT

This document contains five research papers devoted to aviation education and training. The first paper, "An Examination of the U.S. Airline Policy Regarding Child Restraint Systems" (Larry Carstenson, Donald Sluti, and Jacqueline Luedtke), examines communication of airline policy from airline management to airline personnel to the traveling public. Methods of training pilots in Crew Resource Management (CRM) are examined in "Advanced Qualification Training: A Study of Implementation of CRM into Airline Training" (Roger C. Matteson). "The Theory of Functionalism and the International Civil Aviation Organization (ICAO): An Analytical Assessment after the First Fifty Years" (Isaac Richmond Nettey) explores whether functionalist predictions will ever be validated by a transfer of allegiance from nation states to the ICAO. The effectiveness of computer technology in aviation meteorology classrooms was examined in a study reported in "Student Performance in a Technology-Enhanced Aviation Meteorology Course" (Michael R. Witiw, Kathleen Kelly-Benjamin). "Educational Requirements for a Career in Airline Management: An Industry Perspective" (Robert W. Kaps, Jose R. Ruiz) reports on a survey in which presidents of 30 of the top U.S. airlines were asked about the educational preparation needed by students seeking careers. All papers include substantial bibliographies. (MN)

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DEDICATION

to the memory of

Dr. Lawrence J. Truitt

This issue of the **Collegiate Aviation Review** is dedicated to the memory of Dr. Lawrence J. Truitt who passed away this last summer. Larry had agreed to assume the position of Associate Editor of this publication at the close of the University Aviation Association Fall Educational Conference in September, 1997. He was looking forward to this new opportunity and challenge with great enthusiasm. As a member of the faculty at Arizona State University (and prior to that position, as an Assistant Professor at Southern Illinois University at Carbondale), Larry was a spirited and conscientious member of the professional aviation education community.

Larry will be missed by his family and close friends. He will also be missed by his professional friends and colleagues. His absence has created a void in professional aviation circles, especially with the editorial board and staff at the **Collegiate Aviation Review**. The University Aviation Association was anticipating Larry's expertise in aviation education to maintain the high quality of this publication. The members of the University Aviation Association feel a profound loss because of Larry's passing.

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ACKNOWLEDGMENTS

The sharing of scholarly information and the exchange of ideas is a time-honored tradition in academe. The highest level of exchange for members of the University Aviation Association (UAA) is to have a manuscript accepted for publication in the Collegiate Aviation Review (CAR) and for subsequent presentation of that manuscript before the membership of the association. The articles that appear in this edition of the CAR have endured a rigorous blind-review by peer-experts in collegiate aviation; additional rewrites of accepted manuscripts, under the direction of the editor, have also occurred.

Without the objective and insightful review by the following individuals, scholarly writing in UAA would not be possible.

Referees for this edition of the CAR include:

Brent Bowen	University of Nebraska at Omaha
Tom Carney	Purdue University
Larry Carstenson	University of Nebraska at Kearney
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Larry Truitt	Arizona State University
Tom Watson	San Jose State University

My sincerest thanks goes out to all of these individuals who took time from busy schedules to further academic excellence within our association.

Additional thanks go to Ms. Aimee Freeman, graduate assistant at the University of Nebraska at Omaha, for the proof-reading of the final manuscripts.

Finally, our appreciation goes to the Aviation Week Group Newsletters, publisher of Aviation Daily and Aerospace Daily, for printing and distributing this edition of the Collegiate Aviation Review.

Henry R. Lehrer, Ph.D.
Editor

STATEMENT OF OBJECTIVES

The **Collegiate Aviation Review** is published annually by the University Aviation Association, and is distributed to the members of the Association. Papers published in this volume were selected from submissions which were subjected to a peer blind review process, and were presented at the 1997 Fall Education Conference of the Association.

The University Aviation Association is the only professional organization representing all levels of the non-engineering/technology element in collegiate aviation education. Working through its officers, trustees, committees and professional staff, the University Aviation Association plays a vital role in collegiate aviation and in the aviation industry.

The University Aviation Association accomplishes its goals through several objectives. These objectives are:

To encourage and promote the attainment of the highest standards in aviation education at the college level.

To provide a means of developing a cadre of aviation experts who make themselves available for such activities as consultation, aviation program evaluation, speaking assignments, and other professional contributions which stimulate and develop aviation education.

To furnish a national vehicle for the dissemination of intelligence relative to aviation among institutions of higher education and governmental and industrial organizations in the aviation/aerospace field.

To permit the interchange of information among institutions which offer non-engineering oriented aviation programs including business technology, transportation and education.

To actively support aviation/aerospace-oriented teacher education with particular emphasis on the presentation of educational workshops and the development of educational materials in the aviation and aerospace fields.

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for the

1998 UAA Fall Education Conference

and the

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Both qualitative and quantitative research manuscripts are acceptable. All submissions must be accompanied by a statement that the manuscript has not been previously published and is not under consideration for publication elsewhere.

All authors will be required to sign a "Transfer of Copyright and Agreement to Present" statement in which (1) the copyright to any submitted paper which is subsequently published in the ***CAR*** will be assigned to the University Aviation Association (UAA) and in which (2) the authors agree to present any accepted paper to a UAA conference to be selected by the UAA, if requested.

Authors should submit five double-spaced copies of the manuscript, conforming to the guidelines contained in the Publication Manual of the American Psychological Association, 4th Ed. (APA). If the manuscript is accepted for publication, the author will be required to submit the manuscript on 3 ½ inch computer disk in either Word Perfect (6.0 or later version) or Microsoft Word format.

The UAA review process is a refereed process using "blind" peer reviewers. A list of all reviewers is available from the ***CAR*** editor and will be published in the ***CAR.***

Prospective authors may submit, for initial evaluation, a 200 word abstract to the ***CAR*** editor prior to February 1, 1998. All complete manuscripts must be mailed to the ***CAR*** editor with a post mark date no later than April 1, 1998, and should be sent to:

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Any questions regarding the submission or publication process may be directed to the editor at (765) 494-9954 or may be sent by e mail to:

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Graduate students are encouraged to submit manuscripts to the ***CAR*** for review in the graduate student category. A travel stipend may be available for the successful graduate student submission. Contact the editor or UAA for additional information.

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An Examination of the U.S. Airline Policy Regarding Child Restraint Systems

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University of Nebraska at Kearney
and
Jacqueline Luedtke
Utah State University

Abstract

This study examined the policy of the U.S. commercial air carriers regarding the use of infant restraint systems on aircraft. The study determined whether airline management and airline personnel understand that policy and whether that policy is effectively communicated to the traveling public. This study investigated the effectiveness of communication between airline management and airline personnel regarding airline policy for the carriage of infants in commercial airplanes. The results of this survey were analyzed in order to determine if any recommendations could be made to the airlines regarding child restraint systems on commercial aircraft.

Introduction

As much as any major aviation accident, the air disaster involving United Airlines Flight 232 in Sioux City, Iowa, in 1989 emphasized the plight of infant travelers in commercial air travel. Flight 232 was somewhat unusual in that the flight crew and cabin attendants had ample time to prepare for an emergency landing--almost 45 minutes according to the NTSB report submitted after hearings on the accident (NTSB, 1990, p. 21-23). There were four passengers listed with children under the age of two years old on Flight 232. The flight attendants had done everything exactly as they were trained; they had instructed the parents with small infants to place the children on the floor between the legs of the parents. Because the plane cartwheeled upon impact, that method did not work and infant deaths resulted (Child Restraint Systems, 1990).

Current Federal Aviation Regulations (FARs) require everything in an aircraft to be strapped down for takeoff and landing--everything, that is, except infants less than two years of age (Title 14, 1995, Section 121.311). The FARs specify that everyone on board a commercial aircraft ". . . shall occupy an approved seat or berth with a separate safety belt properly secured about him or her during movement on the surface, takeoff, and landing" (Title 14, 1995, Section 121.311b). The regulations continue: "Notwithstanding the preceding requirements, a child may: (1) be held by an adult who is occupying an approved seat or berth if that child has not reached his or her second birthday . . . "

The Federal Aviation Administration (FAA) emphasizes the importance of child restraint systems in the Child Passenger Safety Resource Manual which states, "The Federal Aviation Administration recommends that young children ride in child safety seats during air travel. Child seats will not only enhance the child's safety in the event of a crash but will also protect the child from injury during in-flight turbulence and rough landings" (U.S. DOT, 1993). In the event of an airplane crash, or even in cases of severe turbulence, that unsecured child

may not only be injured but may actually become a human projectile, capable of causing as much damage as an unsecured twenty-pound briefcase.

As long as the government continues to grant to parents traveling with infants the option to either use infant restraint systems or to place the infants on their laps (Title 14, 1995, Section 121.311c), the traveling public and the airlines will be confused about what must be done to insure the safety of those infants. In this study the researchers wanted to determine the policy and practice of the major U.S. commercial air carriers (American, America West, Continental, Delta, Northwest, Southwest, Trans-World Airlines, United and USAir) regarding the use of infant restraint systems. Does management of each airline know what that policy is? Do management personnel communicate with airline employees when policies are implemented, maintained and enforced or are those policies, by default, set by individual airline reservation agents or flight attendants at the time they are dealing with the traveling public? In other words, does confusion exist within the airline industry with regard to the carriage of infants on commercial air carriers?

Purpose of Study

The researchers initiated this study to determine if a lack of communication existed between management of the major United States air carriers and their airline reservation agents regarding airline policy for the carriage of infants in airplanes. It was the perception of the researchers that such a lack of communication could cause confusion among commercial air travelers which might result in inconvenience and possibly even danger to infants who are engaged in commercial airline travel.

The researchers first wanted to determine the policy of airline management regarding the carriage of infants on commercial airliners. Second, the researchers wanted to determine, through the use of surveys, whether that policy was effectively communicated by airline management to airline reservations agents. Third, the researchers wanted to ascertain whether the airline policy regarding infant restraint systems is being effectively communicated to the traveling public. Finally, the researchers wanted to see if any basis exists for advocating a national policy change.

Background Literature

Prior to the issuance of a 1982 order by the FAA (Technical Standard Order C100), the use of passenger-furnished child restraints was not allowed during the takeoff or landing of an airplane (Gowdy & DeWeese, 1994). However, since 1982, the FAA has authorized the use of child restraint devices on airplanes for the carriage of children. The current regulations (Title 14, 1995, Section 121.311(c)) read, in part, as follows:

> No certificate holder may prohibit a child, if requested by the child's parent, guardian, or designated attendant, from occupying a child restraint system furnished by the child's parent, guardian, or designated attendant, provided the child holds a ticket for an approved seat or berth, or such seat or berth is otherwise made available by the certificate holder for the child's use, and the requirements contained in paragraphs (b)(2)(i) through (b)(2)(iii) of this section are met. This section does not prohibit the certificate holder from providing child restraint systems or, consistent with safe operating practices, determining the most appropriate passenger seat location for the child restraint system.

Two questions permeate the body of research and discussion regarding the use of infant restraint systems in commercial air travel. The first is that if the use of such infant restraint systems were made mandatory, would the increased costs (which are certain to result from the mandating of use of infant restraint systems) compel those members of the public traveling by air with small children to select alternate, and potentially more dangerous, methods of travel? The second question is perhaps the more difficult one to understand, or at least accept, from the perspective of a parent of a small child. Would the reduced number of expected infant deaths resulting over a ten-year period by mandating the use of infant restraint systems be cost effective enough to warrant the major expense which would undoubtedly be incurred as a result of such a mandate?

According to Consumer Reports, the act of balancing the financial interests of the commercial air operators against the serious questions of public safety "can create some strange calculus" (FAA, 1995). This article refers to a government study which, using a cost-benefit approach, places a value of $2.6 million on a human life. However, according to the FAA, the cost of mandating the use of infant restraint systems would exceed $1 billion over the next ten years. This causes the FAA to resist new rules mandating the use of child restraint seats in commercial airliners. According to Consumers Research Magazine, the number of injuries or fatalities that could be prevented by infant restraint seats on airplanes is minimal:

> the FAA estimates use of seats would have prevented one infant fatality, one serious injury, and between two and five minor injuries if child safety seats had been used between 1978 and 1990. The NTSB disputes these numbers but does not, according to its congressional testimony, indicate substantial differences. (Spencer, 1994)

Gowdy and DeWeese evaluated the performance of several different child restraint systems including the use of adult lap belts (Gowdy & DeWeese, 1994). They concluded that all forms of child-restraint devices, including the normal adult lap belt (which was being tested by using an anthropomorphic test dummy assumed to be at least 33 pounds in weight), could have some potentially serious consequences for the two-year-old infant weighing less than 33 pounds who is involved in commercial air travel. Although the use of a normal lap belt would be preferred to holding the child on the lap of the parent, the normal lap belt would be marginal, at best, if the child was too small to be accommodated properly by the lap belt.

What was even more interesting is the conclusion by Gowdy and DeWeese that the use of child restraint systems which satisfy the performance standards of Federal Motor Vehicle Safety Standard 213 may not work well in commercial airliners because an entirely different set of forces is imposed on the restraint system when used in an aircraft. Gowdy and DeWeese point out that airplane seats belts differ from automobiles in anchor point geometry, tension adjustment, and buckle hardware. Also, the consequences of seat back break over on airplane passenger seats, combined with aft row occupant impact on the seat back, were not considered in designing the infant restraint systems for use in automobiles.

> The expectation of equivalent protection for children restrained in certain types of CRDs (*child restraint devices*) traveling by automobile cannot be met in an airplane seat . . . . In fact, these tests demonstrated some types of CRDs should not be recommended for use in airplane passenger seats . . . . The main reason is that CRDs are designed to meet an automotive requirement, FMVSS-213, and do not necessarily adapt properly to an airplane seat. (Gowdy & DeWeese, 1994, p. 27)

Insignificant in part because of the research study by Gowdy and DeWeese, the FAA on June 4, 1996 issued a final rule (Federal Aviation Administration, 1996) amending the Federal Aviation Regulations. This amendment withdraws FAA approval for the use of booster seats and vest and harness type child restraint systems in aircraft. The prohibition applies when the aircraft is taking off, landing, or moving about the surface. The prohibition does not apply in flight. The FAA continues to allow infants on board aircraft to be held on the laps of parents during any phase of the flight.

There presently exist two different schools of thought regarding the mandatory use of restraint systems for infants under the age of two years. The FAA says it believes in education, not regulation, because forcing parents to buy an extra ticket and borrow a special seat for their children would result in families being forced to drive instead of fly. That would be riskier, according to the FAA (Field, 1996). Some members of Congress want to mandate the use of infant restraint systems on commercial aircraft. Congressman Lightfoot, 3rd District, Iowa, reintroduced legislation to amend Title 49, United States Code, to require the use of child safety restraint systems approved by the Secretary of Transportation on commercial aircraft. (Congress, 1995) Hearings on this bill were held in August, 1996 (Lightfoot, 1996). It does not appear that the chances of passage of this bill by the 104th Congress are any better than they were when the bill was first introduced several years ago. According to the LEXIS bill forecast (1995 Information For Public Affairs, Inc. 1996), the odds that H.R. 1309 will pass are given as no better than five percent.

Nature of the Problem

The parent of every child traveling in commercial aviation today wants to do absolutely everything possible to protect that child in the highly unlikely event of an airplane crash. The problem is that the parents do not know what specifically must be done to insure the survival of that child when faced with a disaster such as occurred in Sioux City with Flight 232. Consider the testimony of Jan Brown, a flight attendant serving on United Flight 232, when she testified before the House Aviation Subcommittee in support of a bill to require the use of child safety restraint systems on commercial aircraft. During her testimony, Ms. Brown described what had happened immediately after the crash landing at the Sioux City Airport after she evacuated the passengers and exited the airplane.

> Making my way through the corn field, the first passenger I met was Sylvia Tsao, who was headed back towards the burning plane. She told me that she had to return to the plane to find her infant son. I restrained her from proceeding and told her someone would find her son. She turned to me and blurted out that I had told her to place her son on the floor and hold him. She had done that and now he was missing. I was overcome with the knowledge that I would live with those words for the rest of my life. Evan Tsao died in the crash. (Child Restraint Systems, 1990)

Each of the nine airlines appears to have a different policy regarding the carriage of infants in commercial air travel and the proper protection of that child in the event of an emergency. Most parents know what to do if they buy an airline ticket for their child. The FARs mandate that the airlines must allow a child seat to be used in air travel as long as that child seat is approved as specified in the regulations and a ticket is purchased for that child (Title 14, 1995, Section 121.311(c)). The parents may not know, however, what to do if they do not purchase a ticket for their infant.

Mandating the use of infant restraint devices in commercial air travel could potentially solve that problem. However, it is asserted that, if the use of such restraint devices were made mandatory, more children would die. This is assuming that the mandating of the use of such restraint systems would necessitate the charging by the airlines for that extra seat used by the infant, and that extra charge would cause the parent to use an alternative mode of transportation--most likely the automobile (Windle & Dresner, 1991).

Methodology

The study investigates the proposition that there may be communication failures between airline management and airline reservations agents with regard to the transmission of airline policy on the carriage of children under two years of age. To do this, a telephone survey was conducted of both the management personnel and of 45 reservations agents (5 from each airline) of the nine major United States air carriers. The survey employed the hypothetical case involving the commercial air travel of a mother traveling alone with her one-year-old daughter. Interviews determined management policy for each of the airlines and then followed up on management's explanation of that policy by determining what the airline reservation agents tell the parent who travels with an infant less than two years of age.

Data collection considerations led to the selection of the research methodology of this study. The research design progressed as follows. The decision of what data must be collected in order to accomplish the purposes of the study was addressed. Then, the most appropriate method of data collection was considered. Next, the data collection instrument was constructed and reviewed. Following this, the data was collected. Finally, the data was tabulated and interpreted. In this section of the study is contained a brief description of the procedures which were followed.

First, the potential sources of information were determined in several brainstorming sessions among the researchers. After reviewing the literature and becoming familiar with FAA regulations, the researchers concluded that the data necessary for conducting the study would only be available from the airlines themselves. That is, the best source of management policy would be from management and that the best way to determine what reservation agents tell potential customers was to contact the reservation agents themselves.

A telephone survey was selected as most appropriate data collection method for this study. Alreck and Settle (1985) and Simon and Burstein (1985) note that several advantages of gathering data by telephone are: one can contact a widely dispersed group of individuals or sites; no field staff are required, as may be necessary when conducting personal interviews; this method has a relatively low-cost per contact; also, that interviewer bias is more controllable; it is a rapid means of collecting data; and the response rate is much higher than mail surveys. There are two limitations to telephone surveys, relevant to this study, in that questions and the entire interview must be relatively short. In this study, the sources of information are quite widely dispersed. As in many cases, time and funding were strictly limited, which precluded the use of field interviewers.

The researchers required a very high response rate from both management and reservation agents. Therefore, questionnaires were designed to be orally administered during a structured telephone interview with the management of each of the nine airlines and, subsequently, with each of the airlines' reservation agents. The questionnaires were developed using a panel discussion of the researchers, utilizing inputs from a group of experts on the subject, including individuals from collegiate aviation education, airline flight personnel,

and airline management personnel. The proposed questionnaires (one for management and one for the reservation agents) were then reviewed by an airline reservation agent for appropriateness, understandability and overall validity. The structured telephone interview technique was employed, although airline management and reservations agents were given the opportunity to expand upon their responses, if they so desired. In order to reduce the potential of interviewer bias, a different individual was designated to interview the reservation agents than the individual who spoke with management. To address reliability concerns, it was decided to contact several reservation agents rather than only one individual. The data collection procedure and subsequent analysis assumes that a random, unbiased sample survey accurately represents the results which would exist if the survey were of all of the knowledgeable individuals in the field.

Procedure for Airline Management Data Collection

Each of the nine major airlines in the United States was contacted at its corporate headquarters by telephone by one of the researchers. The researchers spoke with a management person at each airline who was knowledgeable about the policy and the procedure of that airline concerning the carriage of infants under the age of two on board their aircraft. The researchers were often directed to persons in customer service, in-flight service or customer safety areas of the airline. The decision regarding the contact person with whom the researchers should speak was made by each individual airline and thus could be seen as a potential limitation to the study.

Since the purpose of the study was to determine airline management policy and the effectiveness of the implementation of that management policy by the airline reservation agents, the researchers first conducted the interviews with management personnel of each airline to ascertain that airline's policies. Airline management was informed that subsequent to their interview reservation agents would be contacted. Management was apprised of the general procedure to be followed in the contacts with the reservation agents.

Procedure for Airline Reservation Agent Data Collection

The telephone survey utilized a questionnaire designed to gather information on the issue of airline policy with regard to the use of child restraint seats and other related topics. The survey was designed for completion in five to ten minutes. To ensure cooperation in providing information, the survey instrument was designed so as to be perceived by the reservation agent as that of a customer seeking travel information. The use of a pseudo-customer helped ensure that responses given by the reservation agents would accurately reflect what the reservation agent would tell an actual customer.

The survey was administered by a single individual to five different reservation agents from each of the nine airlines. By gathering responses from more than one individual from each airline, potential bias was reduced and reliability was verified. The survey was administered by a single individual working with the researchers over a period of two weeks during the summer of 1995. The individual was selected on the basis of education and relevant experience; that is, the person was both an airway science major and a reservation agent for a commuter airline. The interviewer posed as a mother flying with a child for the first time. The interviewer was rehearsed prior to beginning surveying so as to make the presentation as natural sounding as possible.

In order to avoid potential bias, the time of day when the calls were made were determined by using a random-numbers table. To eliminate the possibility of the same reservation agent being contacted twice, the interviewer noted the name of the agent and was instructed to not proceed with the survey should an agent's name match that given in an earlier interview. A debriefing session conducted by the researchers with the interviewer upon completion of all the surveys verified that the data from each survey did, in fact, come from separate individuals.

Results of Interviews with Airline Management

Table 1
Results of Airline Management Survey

Airline	Discount Tickets Offered	Sit on Parent's Lap	Airline Furnishes Child Seat	On Parent's Lap During Crash Landing	Child can Occupy Vacant Seat
American	No Answer	No Answer	No Answer	No Answer	No Answer
America West	No	Yes	No	No answer	Yes
Conti-nental	No	Yes	No	Yes	Yes
Delta	No	Yes	No	Yes	Yes
Northwest	Yes	Yes	No	Yes	No answer
Southwest	Yes	Yes	No	No answer	Yes
TWA	Yes	Yes	No	No	Yes
United	Yes	Yes	No	No	Yes
USAir	Yes	Yes	No	No answer	No answer

Discussions with management personnel at the nine airlines disclosed a willingness by most of the airlines to discuss their concerns and official attitude toward the carriage of infants on their flights (see Table 1). Most airline management personnel demonstrated knowledge of the FAA labeling policy for the determination of an "approved" seat within the meaning of the FARs. None of the nine airlines provides infant restraint systems for passenger use. All of the

airlines allow the use of approved passenger-owned infant restraint systems on board their aircraft.

A majority of the airlines with whom the researchers spoke stated that a discounted fare is available for infants traveling with their parents although the method of computing that discount varies. Most of the airlines were not specific regarding the method of determining the cost of an infant's ticket. Some of the airlines determine the cost of an infant's ticket by using a percentage of the high coach fare. However, the "discount" would appear to be an illusory concept because passengers do not normally purchase a high coach fare ticket. Often the least expensive ticket for a child would be to purchase a normal adult fare on an advance purchase plan according to a majority of the airlines.

All airlines surveyed stated that they allow infants under the age of two to sit on the laps of their parents as authorized by the FARs. The use of an adjacent, unoccupied seat is authorized by a majority of the airlines. However, most airlines stated that the parent will not know if the extra seat is available until the plane is boarded.

No airline furnishes its own infant restraint systems for use by the passengers. All passengers must bring their own infant restraint systems on board the aircraft if they desire to use them for their infants. Most of the airlines stated that the seats must have FAA approval in order to be used on the aircraft.

The most significant area of confusion involved the methods used by the various airlines to brace the infants in the event of an emergency. Most of the airlines said that the parents would be advised to hold the infants on their laps during an emergency landing. One of the airlines informed the researchers that the infants should be buckled into the same seats with their parents. Another airline advised placing the infants on the floor between the legs of the parents. However, one airline has the possibility of an emergency landing well planned. That airline informed the researchers that the infants would be wrapped in pillows and blankets and would be belted into empty seats in the event of an anticipated crash landing.

The information provided by the reservation agents is an indicator of whether airline management's policies regarding the issues surveyed are understood by the representatives of the nine airlines and whether these policies are being correctly communicated to the public.

All forty-five agents informed the interviewer that infants under the age of two years are allowed to fly with their parent without charge. Responses to this question indicate a knowledge of management policy on this issue. All forty-five reservation agents indicated that infants who have not purchased a ticket are expected to sit on the laps of their parents. Airline policy with regard to the placement of infants during emergency situations was mis-communicated in every instance by the forty-five agents. Without fail, the agents informed the interviewer that the parent should belt the infant into the same seat as the parent during an emergency landing (See Table 2).

Table 2
Results of Interviews with Airline Reservation Agents

Airline	Discount Tickets Offered	Sit on Parents Lap	Airline Furnishes Child Seat	On Parent's Lap During Crash Landing	Child can Occupy Vacant Seat
American	*	Yes: 5 No: 0	Yes: 0 No: 5	Yes: 5 No: 0	Yes: 5 No: 0
America West	*	Yes: 5 No: 0	Yes: 0 No: 5	Yes: 5 No: 0	Yes: 5 No: 0
Conti-nental	*	Yes: 5 No: 0	Yes: 0 No: 5	Yes: 5 No: 0	Yes: 5 No: 0
Delta	*	Yes: 5 No: 0	Yes: 0 No: 5	Yes: 5 No: 0	Yes: 5 No: 0
Northwest	*	Yes: 5 No: 0	Yes: 0 No: 5	Yes: 5 No: 0	Yes: 5 No: 0
Southwest	*	Yes: 5 No: 0	Yes: 0 No: 5	Yes: 5 No: 0	Yes: 5 No: 0
TWA	*	Yes: 5 No: 0	Yes: 0 No: 5	Yes: 5 No: 0	Yes: 5 No: 0
United	*	Yes: 5 No: 0	Yes: 1 No: 4	Yes: 5 No: 0	Yes: 5 No: 0
USAir	*	Yes: 5 No: 0	Yes: 0 No: 5	Yes: 5 No: 0	Yes: 5 No: 0

* This question was not answered by any of the reservations agents because the question was: "When I buy my ticket, do I have to buy a ticket for my daughter? If so, does my daughter pay the same rate as I do or is there a discount fare for a one-year-old?" Since all of the reservation agents stated that it was not necessary for the parent to purchase a ticket for the infant, the question regarding the discount was not answered.

Forty-three agents informed the interviewer that infant restraint systems were not supplied by the airline. One agent was unsure and another indicated that the airline would provide the seats on a fee rental basis. All forty-five agents assured the interviewer that passengers were free to bring their own infant restraint systems on board the aircraft. No agents mentioned that the seats had to be FAA approved.

Table 3
Additional Survey Results of Airline Reservation Agents

Airline	Is Free Seat Assigned W/O Ticket?	Will Adult Seat Belt Protect Child?	Can Parent Bring Own Seat?	Does Child Seat Count as Carry On?
American	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 3 No: 2
America West	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 4 No: 1
Continental	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 4 No: 1
Delta	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0
Northwest	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0
Southwest	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0
TWA	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0
United	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 4 No: 1	Yes: 3 No: 2
USAir	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0	Yes: 5 No: 0

To provide additional information to the traveling public questions were asked of the reservation agents by the interviewer in addition to those asked of management. The results of these additional questions are tabulated in Table 3 above. All of the agents responded that if the child were flying at no charge, it would not be possible to specifically assign a seat to that child. All agents assured the interviewer that if the infant had a separate seat on the aircraft, the adult seat belts would be adequate restraint protection for the infant.

If a passenger were to bring a car seat along for a non-paying infant, thirty-nine agents were of the opinion that the car seat would count against the paying passenger's carry-on allowance. Six agents indicated that their airline would not count the infant restraint system against the allowance. These six agents represented five different airlines (see Table 3).

Interpretation of Survey Results

It appears from the survey results that, in general, management's policies regarding airline travel by infants have been effectively communicated to the reservation agents. It is clear that infants can fly free on all of the nine airlines and all of the airlines allow the parents

to bring an infant seat on board the aircraft although airline management differed from the agents on the exact requirements of the infant seat.

The airlines differed from each other on policies covering the use of infant restraint systems and how to interpret those policies. In many areas, reservation agents either did not understand management policies or did not convey such policies to the customer. The most significant area of confusion or disagreement between management and the reservation agents was in the area of emergency procedures. It must be acknowledged, of course, that airline reservation agents are not trained in aircraft emergency procedures. Thus, their lack of knowledge in this area is understandable. However, management, being aware of that lack of knowledge by the reservation agents, should discourage the agents from making any authoritative response to customers who inquire about such procedures unless the agents are first given additional training in that area.

Recommendations

United States airline management personnel need to continually educate and inform their reservations agents regarding the policies of their airlines in the use of infant restraint systems. In the education of the reservations agents airline management personnel need to place more emphasis on the FAA requirements controlling use of the infant restraint systems on board commercial aircraft. Members of the public traveling with infants need to be properly informed of airline policy and FAA requirements when they call to make reservations for travel on commercial aircraft with their small children. A resolution needs to be reached regarding the two different approaches to the problem of restraining infants on airplanes: education regarding the use of infant restraint systems or mandating the use of such systems, as was discussed in the section of this research article entitled Background Literature. Infant lives would undoubtedly be saved if the airlines and the FAA combined now to jointly cooperate on an intensive effort to educate the traveling public regarding the use of infant restraint systems on commercial aircraft.

One solution to this dilemma, for the short term, is for all of the airlines to cooperate in the development of a policy, consistent among all of the airlines, which guides the reservations agents and the flight attendants regarding the carriage of infants on commercial airliners. Airlines can capitalize on the desire of families to travel as a unit by advertising themselves as "family friendly" airlines. Airlines could also follow the lead of the automotive industry and include in the refurbishment of existing airplanes, or in the design of new airplanes, special child seats such as are installed in some of the new automobiles.

Whatever approach to the use of infant restraint systems is finally adopted, it should be accomplished before more infant lives are lost. If the use of infant restraint systems is not mandated, then both the FAA and the airlines should educate the public regarding the use of infant seats, and the parents of infants should be strongly encouraged to always use infant restraint systems for their small children who are traveling by air . Additional research should be accomplished and surveys should be conducted to determine if a significant education program implemented by the FAA and by the airlines would result in an increase in the voluntary purchase of additional airline seats and the use of infant restraint systems by parents traveling with their infant children.

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ADVANCED QUALIFICATION TRAINING: A STUDY OF IMPLEMENTATION OF CRM INTO AIRLINE TRAINING

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Introduction

The emphasis in training pilots on today's aircraft is placed on preparing the crew to interact with each other and to recognize any problem that may occur long before such a problem becomes a flight hazard. The training that is necessary to do this is called Crew Resource Management (CRM). Although CRM has been used by the airlines for about the past ten years, no integrated training among the airlines has been formulated until recently. Recent pressure from outside sources has prompted the FAA to initiate action to formalize CRM training in the airlines. The Federal Aviation Administration (FAA) established Special Federal Aviation Regulation (SFAR) 58, which created the Advanced Qualification Program (AQP) (Federal Aviation Administration, 1990). This allowed the airlines to develop their own training program which incorporates CRM and Line Operational Simulations (LOS). LOS utilizes simulator training using a typical operational passenger flight scenario, in a controlled training environment. It is designed to improve cockpit/cabin communication and coordination skills, and pilot decision-making skills (Federal Aviation Administration, 1995).

Background of CRM

In the early 1980s, Clay Foushee a NASA researcher, showed that communication between pilots in an automated aircraft was of great importance because of the systems complexity (Hughes, 1995). This was the beginning of implementing CRM into the training program of aircrew. Foushee's study goes on to suggest that information sharing among aircrew members is a key ingredient of CRM.

In another study covering the period from 1978 to 1990, the National Transportation Safety Board (NTSB) investigators compared thirty-seven airline accidents and determined that in eight, flight crews were causal factors (Phillips, 1994). Communication breakdown between the aircrew was the main factor cited in all eight accidents. Recommendation from the study by NASA has resulted in increased emphasis on training the aircrew in CRM (Phillips, 1994).

From the period 1987 and 1992, large carrier accident rates have steadily declined by an average of greater than 0.1 accident per 100,000 hours of major airlines flying time (Federal Aviation Administration, 1996). This coincides with the start of CRM training in the airlines. Figure 1 illustrates the decrease of the accident rate in those years.

From the same period 1987 and 1992, commuter carrier accident rates have not shown any consistent pattern in decline or rise. CRM had not been used to any great extent during those years on commuter airlines. Figure 2 illustrates the accident rate in those years.

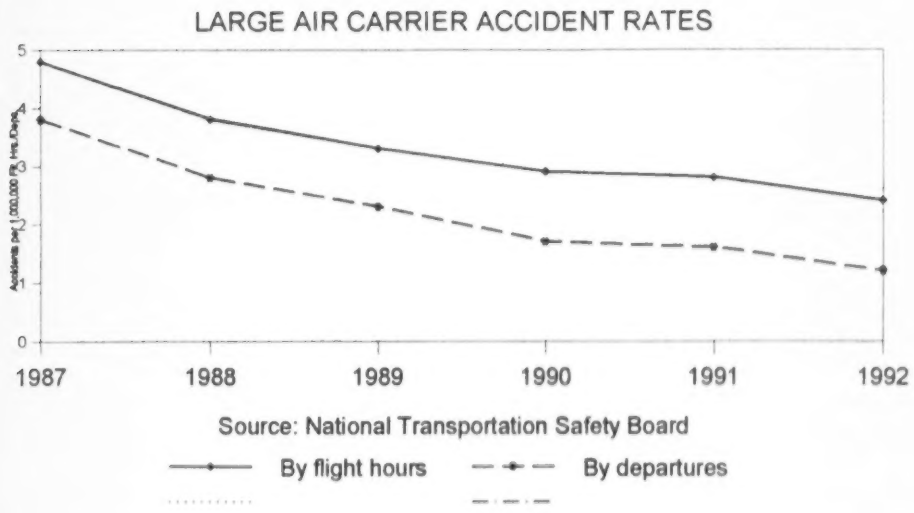

Figure 1 (FAA, 1996) Large Carrier accident rates between 1987 and 1992.

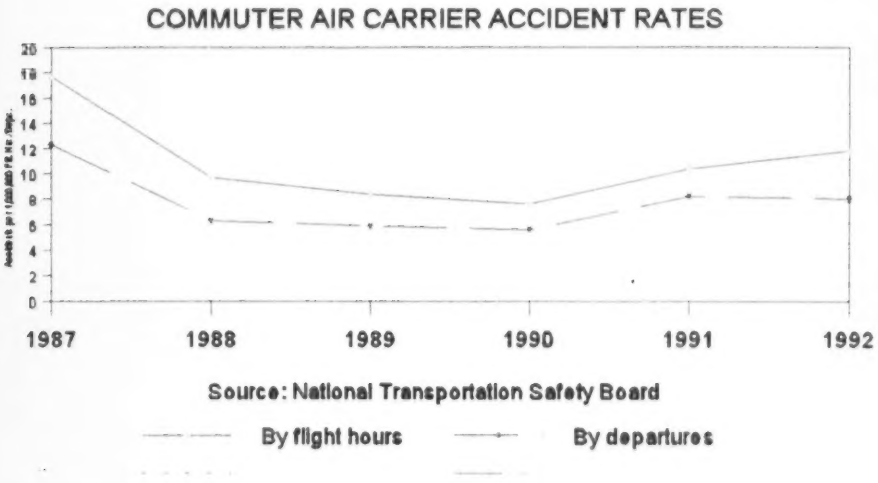

Figure 2 (FAA, 1996) Commuter Carrier accident rates between 1987 and 1992

CRM Training and Implementation

To begin to train aircrew in CRM, the screening process must take place from the initial interview of the applicant. After the screening, CRM is placed into two parts. The first part

focuses on the individual and the second part as a member of the team. Training must be structured to address both individual and team level processes and behavior (Endsley, 1995). The individual phase concentrates on critical information seeking and information processing behaviors needed for individual situation assessment and awareness. For the team phase, training focuses on complex communication behaviors and team planning (Salas, Prince, Baker, & Shrestha, 1995).

Many airlines have already placed a high emphasis on CRM. United Airlines has revised its policy on training aircrew. No longer does it focus on how the airplane works but more on how the aircraft team works. Aircraft have been getting more automated and the need for in-depth knowledge of basic aircraft systems is de-emphasized (Scott, 1995).

CRM as a Continuous Training Process

CRM is an on-going process. The initial training of the crew is just the beginning. Different studies have suggested that on-going training or recurrency training be implemented. Suggestions from six months to one year have been stated. Studies have argued that performance during and shortly after training is less sensitive to personality effects than performance after long exposure to operational conditions (Helmreich, Sawin & Carsrud, 1989). These same studies suggest that after initial training most people are motivated and want to do as good as job as possible. However, over time the job may become more routine. Initial motivation decline and personality characteristics, such as intrinsic achievement motives, may become more important predictors of performance (Helmreich, Chidester, Gregorich, & Geis, 1991).

Initiating Early Training of CRM

Crew-oriented training is emerging as the preferred method to be followed from the time a student takes the first flying lesson until sitting in the cockpit of a large transport. The emphasis on human factors is driven by the fact that 65% of jet transport accidents are caused by human error (Hughes, 1989). Introducing CRM from the beginning of the process allows for the early introduction of human factor related training, which teaches pilots to communicate effectively and to work as a team.

The University of North Dakota, in conjunction with Northwest Airlines, developed a curriculum for students with no prior flying experience who are planning on becoming airline pilots. CRM plays a major role in the new curriculum, which consists of three separate courses (Hughes, 1989). The courses range from the students critiquing each other's performance to changing roles from captain to co-pilot. Simulators are mostly used for the role reversal with some time in actual aircraft. An evaluator or instructor sits in back to evaluate their overall performance.

Incorporating AQP into Airline Training Programs

The development of AQP started in the 1980s. Numerous accidents in the 1970s and 1980s were attributed to communication and management problems of the flight crew. The 1980s were a few of the worst years in terms of accidents for the airlines. This led the FAA administrator, T. Allan McArtor, in 1987 to request that aviation related special interest groups get together and find a solution to these accidents (Tenney, 1992). These groups determined that the training and the way in which training was conducted was a major factor that could be

improved in order to increase the safety of the airlines. From this, SFAR 58 evolved and was signed into legislature by FAA administrator James B. Busey in 1989 (Tenney, 1992). SFAR 58 created AQP, which institutes the ability for an airline to develop their own training program incorporating CRM and LOS.

An AQP is a program developed by an airline that is specific to that airline and aircraft type. The program focuses on certain items in the training that are neglected under current training standards in Part 121 and Part 135. Added emphasis is placed upon CRM, LOS, communication skills and advanced training equipment (Federal Aviation Administration, 1991). The training that is conducted under AQP focuses on training as a crew and develops coordination skills required of the crew.

Simulator and Computer Use in AQP

The use of Simulator-based training (SBT) and Computer-based training (CBT), are being implemented and heavily relied upon when training in AQP. The primary reason for using this ground based equipment is financial savings and time. CBTs are simulations that create real-world environments on desk-top computers or low cost trainers to teach skills such as mastery of complex flight management systems (Henderson, 1996). SBT integrates courseware associated with traditional CBT and the fidelity of full flight simulator software. The SBT also can feature graphic display workstations, large projection screens and instructor stations to the host simulator's real-time simulation models (Orlady, 1994).

There have been substantial advances in virtually all CBT areas, and there continues to be further technological increases in the field. According to Orlady, among the advantages attributed to such training are the following:

1. It is more economical than lecture-type instruction.
2. It ensures that all trainees receive the same and correct information.
3. It does not require large numbers of expert instructors.
4. It reduces undesirable pressure on trainees by permitting them to proceed at their own pace (1994).

Due to the introduction of the CD-ROM, CBT has expanded itself to interactive multimedia. According to Bill Thomas, director of operations at the Air Transport Association, CBT will become even more widespread as airlines move into proficiency-based training under AQP (Henderson, 1996). One of the main interests in CBT is the reduction of time spent in training and the initial increase in proficiency from the pilots. R. Blayloch, director of learning technologies research for American Airlines, states that a two week training course can be cut in half by changing from lecture to interactive multimedia. Blayloch states that this would have a possible learning improvement of about 30% (Henderson, 1996).

Current Issues of AQP

Airline training costs are a large portion of the expenses that an airline incurs in its operation. Many airlines would be genuinely interested in a method of reducing these costs, but they appear to be ever-growing with increased regulations. Recent proposed rule makings by the FAA will make training costs skyrocket, leaving many smaller airlines operating small and diverse fleets on the verge of financial bankruptcy. In order to trim costs on training, many airlines have utilized outside assistance from training centers such as Flight Safety International, Simuflight and Avtar. These centers may have a more definitive future in the training of airline pilots since the FAA made AQP mandatory in the airline's training.

Due to the lack of any standardized training among the airlines, Rep. James L. Oberstar (D. MN), chairman of the House aviation subcommittee, at a safety conference in Washington, D. C. suggested that AQP be mandatory (Hughes, 1995). This prompted the FAA to submit a Notice of Proposed Rule Making (NPRM). NPRM : Air carrier and commercial operator program (AC 120-54; AFS-210) became effective March 19, 1996 (Federal Aviation Administration, 1995). The NPRM makes the use of CRM and LOS mandatory for Part 121 Certified Carriers, and Part 135 Commuter Air Carriers who operate aircraft requiring two or more flight crew members and/or operate aircraft of 10 or more seats (Hughes, 1995). This is the first time the FAA has proposed any regulation towards making CRM or LOS training mandatory for the airlines. In the past, the FAA has only suggested that the airlines follow guidelines set up by them.

In the NPRM, the FAA has researched the potential savings that the Part 121 and Part 135 operators would save by the decrease in the accident rate over a period of ten years by implementing AQP. The initial training costs for some Part 135 operators would be high due to implementation of the training program, but the long term savings would eventually offset any up-front cost. The question would be if the operators could survive long enough to see the long term savings.

Over the next ten years, the FAA projects the total discounted value of benefits from implementing AQP to be $305 million for both Part 121 and 135 operators (Federal Aviation Administration, 1995). The FAA estimates the benefits from requiring AQP training for Part 135 pilots to be $98 million from 1995 to 2004. The cost of implementing the training would range from an $9 to $12 million. This would make the long term benefits to be substantial (Federal Aviation Administration, 1995).

Possible Problem with AQP

As suggested earlier in the research, a major obstacle is the initial cost of setting up AQP training centers. The major airlines have the resources available to set up these programs and initiate training without too much of a financial burden. Some commuter airlines do not have the luxury of having large resources to fund such training programs. One of the initial concerns when the FAA established procedures for establishing AQP was the possible financial burden to the smaller commuter airlines.

Conclusion

It is evident that the pilot of today does need a multifaceted training program to operate today's complex aircraft. They need the technical skills that have always been needed to fly the aircraft, judge weather conditions, apply aerodynamics, handle emergencies, and navigation skills. The pilot also needs the interaction skills that were discussed in this paper that they would receive from CRM training. Putting the two training formats together and measuring those skills is what AQP is all about. Not until the last three years have the airlines been able to develop such programs for more effective and comprehensive training of their pilots.

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THE THEORY OF FUNCTIONALISM AND THE INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO): AN ANALYTICAL ASSESSMENT AFTER THE FIRST FIFTY YEARS

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Abstract

The search for world peace has enjoyed perennial attention among scholars and world leaders throughout the ages. Closely allied with the search for world peace is an equally tenacious quest for order, peace and stability in international society. Integrationist theories which postulate the ultimate unification of world communities as a path to world peace constitute one avenue developed by statesmen and political scientists with an interest in world peace. Chief among integrationist theories is the theory of *functionalism* which gained appreciable currency in the aftermath of World War I. "Classical functionalism relies upon the cooperative pursuit of common interests in nonpolitical fields to generate political changes conducive to peace" (Claude 1956, p. 405).

Fundamental to the theory of functionalism were the seminal writings of David Mitrany (1933, 1943), who contended that with the increase in technological sophistication and the need for systemic solutions to complex problems which transcend national borders, people will ultimately transfer their allegiance from nation states to effective international agencies with functional missions which involve the development of international economic and social cooperation. The ample parameters of functional missions include such specific goals as the eradication of poverty, diseases, illiteracy, economic insecurity, exploitation, as well as the elevation of living standards through reductions in the interference caused by national frontiers in an interdependent global economy and improvements in international air travel and commerce.

Functionalism therefore constitutes an important theoretical bedrock for several intergovernmental organizations (IGOs) established to fulfill functional responsibilities in the first half of the twentieth century. Among the IGOs with functional responsibilities is the International Civil Aviation Organization (ICAO) which was formed by 52 nations during the Chicago Conference of 1944. ICAO was formed with the functional mission of ensuring the development of international civil aviation in a safe and orderly manner. As ICAO moves beyond its first half century, it is prudent to conclude that international civil aviation is quite safe and very orderly. After a careful narrative analyses of the theory of functionalism and ICAO, this paper concludes that the jury may still be out on whether functionalist predictions will ever be validated by a transfer of allegiance from nation states to a functional IGO such as ICAO.

Introduction

The carnage of World War I, and a certain optimistic belief that wars could be eradicated by integrating the peoples of the World, gave considerable impetus to integrationist political theories after World War I. Integrationist theories are primarily concerned with promoting world peace through the integration of political communities. Of all the political

communities who exert an impact on the world stage, nation states through their respective national governments, constitute the primary actors in international affairs. As such, nation states as unit and rational actors, receive considerable emphasis in integrationist theories.

Critical to the broader subject of integrating political communities are the fundamental political questions of why citizens give allegiance to a nation state and how political systems, especially the nation state, remains cohesive. Nation states are of particular importance in this discussion primarily because they have become the dominant unit actor in international politics since their inception at the Treaty of Westphalia in 1648 and subsequent validation at the Congress of Vienna in 1815 (Bull,1977). In addition, political scientists concerned with integrationist policies focus considerable attention on the role of nation states in international conflict.

The first of two reigning schools of thought traces the locus of cohesion within political systems to consensus - widely shared values among a political system's citizens and general agreement about the structure and function of the political system. Consensus in this context is akin to Kissinger's (1964) concept of legitimacy. Consensus among citizenry and its governing entity is the locus of some legitimacy for a regime. In scholarly work closely related to this issue, Reinhold Niebuhr (1949) and Hans Morgenthau (1962) have successfully argued that world government is simply not possible without greater consensus at the global level.

The second school of thought on cohesion within political systems primarily advocates the presence of *coercive force*, or the *threat of force*, as an indispensable prerequisite for cohesion within a political system. Thomas Hobbes (1967) and Ralf Dahrendorf (1959, 1968) could be placed within the second of the two schools of thought. A careful examination of the two schools of thought indicates that they are not necessarily mutually exclusive since coercion may have an interactive effect on the development and maintenance of consensus in a political system.

Dominant among integrationist theories is the concept of functionalism. Functionalism is not only dominant among integrationist theories, it is perhaps one of the earliest forms of integrationist theories. Indeed, functionalism as a political theory, may be responsible for spawning similar theoretical concepts of political integration. Within the confines of political science and international relations, integrationist concepts similar to functionalism that have enjoyed theoretical currency may include regionalism, alliance cohesion, sector integration and neo-functionalism.

A theoretical analyses of the theory of functionalism and the work of the International Civil Aviation Organization (ICAO) after its first half century shall remain the subject of this paper. The paper initially discusses the theory of functionalism and then explores the viability of functionalism as a practical concept in international politics through the work of ICAO. This paper analyzes the theory of functionalism primarily because the larger question of world peace still remains a salient issue of critical importance to the continued existence of international society. For both professionals and scholars involved in international politics or aviation, ICAO may represent one of a limited number of important examples of a successful functional intergovernmental agency (IGO) on the world stage .

Functionalism

Conceptual Origin

Functionalism as a political theory in IR may owe its name and meaning to the fact that the "functional" sector of international organizations generally refers to activities related to the promotion of human welfare. Activities directed towards promoting human welfare on a global scale include technical, economical, social, humanitarian and social justice issues directed towards improving the quality of life *vis a vis* the prevention of war or the elimination of national insecurity (Claude,1971).

International politics prior to the end of World War I focused almost exclusively on national security issues and the prevention of war. International summitry and diplomacy prior to the nineteenth century seldom, if ever, focused on social welfare issues. Social welfare issues were primarily viewed as intrastate issues which fell strictly under the jurisdictions of respective sovereign nations. The concept of functionalism has provided an alternative to the traditional legal conceptions of the nation state and of sovereignty (DeVree, 1972, Dougherty and Pfaltzgraff , 1994).

Mitrany's Functionalism

Functionalism as an IR theory came into being largely as a result of the professional and scholarly work of the British civil servant, David Mitrany. Writing between World Wars I and II, and in the post war years, Mitrany postulated that "the problem of our time is not how to keep the nations peacefully apart but how to bring them actively together" (Mitrany, 1966 p. 28). Without tackling the issue of peace directly, Mitrany advocated the development of special purpose organizations which will fulfill important needs of the world's citizens directly (1933, 1966). Such needs include elevation of living standards, reduction or elimination of illiteracy, ill-health, economic insecurity, social injustice, exploitation and discrimination.

Through direct fulfillment of social needs at the global level, special purpose organizations will succeed in "linking authority to a specific activity, ... and in the process breaking away from the traditional link between authority and a definite territory" (Mitrany, 1966 p. 27). Through this approach, the activities of international agencies would encourage a shift in the allegiance of the World's citizens from their respective sovereign nations to international special purpose organizations. As stated by Mitrany (1966) in *A Working Peace System*:

> Sovereignty cannot in fact be transferred effectively through a formula, only through a function. By entrusting an authority with a certain task, carrying with it command over the requisite powers and means, a slice of sovereignty is transferred from the old authority to the new; and the accumulation of such partial transfers in time brings about a translation of the true seat of authority. (p. 31)

Creation of transnational allegiances to supranational political entities will ultimately result in *defacto* integration of nations which Mitrany calls "federalism by installments" (1966, p. 83). Functionalism would thus "overlay political divisions with a spreading web of international activities and agencies, in which and through which, the interests and life of all the nations would be gradually integrated (Mitrany, 1966).

Integration of nations through functional activities would thus result in a significant diminution, if not outright elimination, of the need for war. In other words, if the nations of the World are fully integrated and functionally engaged in productive activities to improve life for all persons, there shall be neither the need nor rationale for such destructive enterprises as interstate war. The ultimate elimination of war through gradual integration of nations is felicitously characterized as "peace by pieces." (Schuman , n.d.) In addition to the ultimate prevention of war, Mitrany also believed the activities of special purpose international agencies would lead to the "development of authoritative world political institutions" (Claude, 1971 p. 380).

Underlining Mitrany's concept of functionalism was the belief that increases in the complexity of technical and nonpolitical challenges facing governments in the twentieth century have created a demand for technical specialists and an international approach to solving problems. Problems related to health care and halting the transnational spread of deadly pathogens as well as, complex technological problems caused by growth in global transportation and communication, made a collaborationist approach to solving global problems mandatory. In a major departure from historical practice in relations between sovereign nations, the main units engaged in collaborationist efforts to solve the World's problems under functionalist theory will be technical specialists, not political elites. Collaborationist efforts under functionalism involve technical specialists who work within an international framework of technical cooperation which transcends sovereign nations. Unlike the political elites who had dominated international relations in the past, the technical specialists under functionalism can be expected to be apolitical technocrats who will focus on technical issues and not remain preoccupied with power politics which has historically led to war.

Functionalism and Ramification

Functionalism predicted the proliferation of international frameworks for technical cooperation as technological developments become more complex and widespread in application throughout the world. The predicted proliferation of international frameworks for technical cooperation is congruent with Mitrany's doctrine of *ramification*. Ramification asserts that collaboration in one technical field has a multiplier effect which manifests itself in additional collaborationist efforts in other technical fields at the global level. Preceding Mitrany's writings on functionalism and ramification was Paul S. Reinsch who postulated a similar doctrine under the concept of "concentric circles of cooperation" which will emanate from the limited area of technical agencies to solve other global problems of a political nature (1911). In additional work on ramification, Paul G. Hoffman also contended that when habits of unity are cultivated in the economic sphere, they naturally spread over to the political sphere and even to the military sphere when the need arises (1951, p. 62). Somewhat akin to Mitrany's ramification is the concept of spill-over. Developed as a result of analytical studies of the European Coal and Steel Community (ECSC) by Ernst Haas, the concept of "spill-over" generally refers to the tendency of persons who have benefitted from the collaborationist efforts of supranational institutions in one functional area to advocate and support integration in other areas (1964, p. 48). Eventually, collaborationist efforts which are cooperative in nature absorb the political sector. In this respect, functionalism regards cooperation, instead of competition and conflict, as the dominant behavioral paradigm in international relations. Functionalism can therefore be envisaged as a theory which is "peace oriented and seeks to

avoid a win-lose stalemate framework" (Groom & Taylor n.d.). In effect, functionalism represents a fairly radical departure from the international relations concept of realism[1]. As contrasted with the concept of realism, functionalism may be more normative than descriptive of international politics.

Directly descending from functionalism, is the more recent concept of neofunctionalism which has modified functionalism through testing of hypothesis with a special, if not exclusive, emphasis on the European Community. Leading proponents of neofunctionalism include Ernst Haas, Robert Keohane, Leon Lindbergh, Joseph Nye, Lawrence Scheineman and Phillipe Schmitter. The scope of this paper will not permit a thorough discussion of neofunctionalism as a modification of the integrationist theory of functionalism.

Functionalism in the Post World War I Era

Prevention of war enjoys perennial attention. Concern about the prevention of war, especially interstate war, significantly heightened after World War I. In the post World War I atmosphere of deep concern about preventing interstate war, functionalism enjoyed considerable currency among the political elite in Western nations. Proponents of functionalism touted their belief that "the development of international economic and social cooperation is a major prerequisite for the ultimate solution of political conflicts and elimination of war" (Claude, 1971 p. 379).

In the post World War I era, there was extensive belief in functionalism's claim that the need for nation states to jealously guard their respective sovereignties inexorably leads to war between their respectively carved pieces of the world. Worse yet, both the socioeconomic and technological development of the world was presenting challenges which transcend the capabilities of individual nation states. Solutions to such challenges could only come from an international group of experts who work under the umbrella of a supranational functional organization. Solutions to global problems and challenges lie with "problem solving agencies coterminous in territorial competence with the problem areas" (Claude, 1962 p. 382), not fragmented groups artificially segregated by the equally artificial borders of their respective nations states.

Faith in the preceding proposition caused the germination of several policies and practices in international politics which were firmly grounded in functionalism. Functionalism as a theory therefore enjoyed operational and practical implementation through the establishment of several international organizations in the aftermath of World War I. Chief among the post World War I international organizations were the League of Nations and the International Labour Organization (ILO). The League of Nations, originally a "nonfunctionalist" organization, overwhelmingly emphasized political matters in a deliberate attempt to exclude nonpolitical matters. Pressure from Great Britain and General Smutts[2] prevailed in securing the inclusion of Articles 23-25 in the League's Covenant, thus allowing cursory involvement in

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[1] *Realism*, a dominant political theory governing US foreign policy and international relations since World War II, postulates that conflict and competition, not cooperation, are the dominant paradigms in international politics

[2] General Jan Smutts of South Africa was instrumental in founding the RAF, and by proxy, the USAF through his influence on Billy Mitchell, his *aide de camp* in the early years of World War II

functional issues. Unlike the League of Nations, ILO was the international entity primarily tasked with responsibilities of a functional nature in the post World War I era (Claude, 1971).

Notwithstanding the limited emphasis on functionalist responsibilities in its charter, the League emerged as an international organization with major functional emphasis and established several technical organizations for international assistance, sponsored international conferences and served as a forum for stimulating and coordinating multilateral efforts to cope with complex modern economic and social problems (League of Nations, 1938). The League might have turned its attention to functionalism either because its efforts in political matters were a rum affair, or it needed to find new uses for its administrative machinery. The most enduring legacy of the League were probably, the accomplishments of its functional agencies and its successful demonstration of the potential for international cooperation and collaboration in areas remote from the issue of power politics (Claude, 1962 p. 392).

Success of the League's functional agencies significantly contributed towards the establishment of a battery of functional institutions as Specialized Agencies of its progeny; the United Nations (UN). Among the Specialized Agencies adjunct to the UN were the ILO, Food and Agricultural Organization (FAO), United Nations Educational, Scientific and Cultural Organization (UNESCO), International Civil Aviation Organization (ICAO), International Bank for Reconstruction and Development (IBRD), International Monetary Fund (IMF), International Finance Corporation, International Development Association, World Health Organization (WHO), Universal Postal Union, International Telecommunications Union (ITU), World Meteorological Organization (WMO), and Inter-governmental Maritime Consultative Organization. In addition to the preceding list is the International Atomic Energy Agency (AEA) which has a distinctive formal status but may be considered as a *quasi* Specialized Agency group. It may be appropriate to indicate that several of the Specialized Agencies, such as the ILO and ICAO, were established before the UN was established.

American initiative is credited with the ambitiousness of the scope of the UN's Specialized Agencies and the decentralized character of its administrative pattern (Stettinius, 1949). It is somewhat paradoxical that although United States foreign policy does not enthusiastically subscribe to functionalism, it turned out to be the main supporter of the functionalist enterprises of the newly chartered UN. US support for the UN's functional agencies may be explained by the fortuitous coincidence of America's conception of an effective halt to the spread of communism with the functionalist conception of how best to build the foundations of a peaceful society (Claude, 1968). In reviewing the breadth of the functionalist thrust of the newly chartered UN, it has been rightly contended that "... never in the history of mankind has an attack on the first causes of war been launched on so many fronts and with the mobilization of comparable scientific resources " (Martin, 1952, p. 22)

Over the last five decades of its existence, the actual work of the UN has primarily revolved around helping nations and fostering intergovernmental assistance between nations through fact finding, research, sponsorship of consultation on an international scale, and standardization or harmonization of national programs and policies. It is primarily in the functional area of standardization of national programs and policies that ICAO has thrived. The remainder of this paper will discuss the function of ICAO in an analytical attempt to determine the effectiveness or success of functionalism as an international relations concept or paradigm.

International Civil Aviation Organization

As is typical of its sister Specialized Agencies, and other IGOs at the UN, ICAO is a technical body. Unlike its sister Specialized Agencies, ICAO deals with a relatively new phenomenon, commercial air transportation. Growth in commercial air travel has ensured its rapid rise as the preferred mode of transportation for journeys exceeding 200 miles in the United States and journeys exceeding a thousand miles around the world. That this feat occurred in less than half a century after commercial air transportation began, is a wonder! Even more incredible, is the realization that this feat is unparalleled in the history of transportation which spans several millennia. Within fifty years of its introduction, commercial air transportation successfully developed to the point where it could "carry man and his goods anywhere and everywhere without fetter and without halt" on Earth (Facts About ICAO, 1994).

Of some considerable importance is the fact that the phenomenal growth of commercial air transportation has been adventurous, yet remarkably orderly. Today, a flight can regularly depart from New York, with an appreciable degree of confidence, that after a series of requisite stops for fuel and other logistical supplies, it would make it to Timbuktu in Mali, and return to New York, if necessary, before the day is over. In Timbuktu, the flight would execute approach procedures quite similar to what it would in Chicago. Such orderliness and harmony in international affairs is neither accidental nor ordinary. Much of the credit for the harmonious growth and operation of commercial air transportation, especially international air travel, could be ascribed to functionalist cooperation between nations through summitry for functional purposes and collaborative work on an international scale. Functionalism, in the form of intergovernmental summitry and international collaboration, were instrumental in the formation of ICAO.

ICAO was formed to fulfill quite a specific and somewhat limited set of functions which has not altered significantly since its formation. The governing philosophy of ICAO, as spelled out in the preamble to the Convention on International Civil Aviation (Chicago, December 7, 1944) below, is very functionalist in orientation:

> Whereas the future development of international civil aviation can greatly help to create and preserve friendship and understanding among the nations and peoples of the World, yet its abuse can become a threat to the general security; and Whereas it is desirable to avoid friction and to promote that cooperation between nations and peoples upon which the peace of the World depends; Therefore, the undersigned governments having agreed on certain principles and arrangements in order that international civil aviation may be developed in a safe and orderly manner and that international air transport services may be established on the basis of equality of opportunity and operated soundly and economically; Have accordingly concluded this Convention to that end.

Historical Origin

Technological developments during war have always expedited improvements in aeronautical technology. At the end of World War I, the first international summit on aviation - the Paris Convention, was held in 1918 to develop the rudiments of international air law. The main issues of concern revolved around the concept of sovereignty over territorial airspace and protocols for international air travel, as well as subordinate issues of comity in crew and equipment licensure. Participation was limited to a few European nations who had managed

to develop comparably limited networks of commercial air transportation service by 1918. Much of the preparatory work for the Paris Convention was patterned after maritime law partly because most European colonial powers had historically subscribed to Sir Walter Raleigh's dictum:

> Whosoever commands the sea, commands the trade; whosoever commands the trade of the world commands the riches of the world, and consequently the world itself.

Recognition of the potential wealth, through trade, offered by the fledgling mode of transportation was not lost on the delegates at the Paris Convention. To consolidate their gains, the International Commission on Air Navigation (ICAN) was established in Paris in 1919 (Mance, 1944, Van Zandt, 1945). ICAN was limited in scope and so it functioned as a limited technical body over a relatively short period.

The second World War "telescoped a quarter-century of normal peace-time technical developments in aviation into six years" (Memorandum on ICAO, 1994 p. 8). Anticipation of a significant growth in demand for commercial air service at the end of World War II, and an appreciable degree of conviction in a functionalist approach to international relations, led the allied nations of Canada, Great Britain and the United States to convene the Conference on International Civil Aviation, a.k.a. The Chicago Conference. Fifty-two of the 55 nations invited to the conference, excluding the Soviet Union, sent delegates to Chicago in November, 1944. After five weeks of deliberations, the delegates were successful in developing the previously stated preamble, *Convention on International Civil Aviation* which was signed on December 7, 1944 (Memorandum on ICAO,1994). In addition to the preamble, delegates to the Chicago Conference also established a protocol or convention, known as the Chicago Convention, and an administrative agency tasked with responsibilities for implementation of the Chicago Convention. The Chicago Convention came into force on April 4, 1947, thirty days after its ratification by the 26th contracting state. The Provisional International Civil Aviation Organization (PICAO), formed with advisory powers only, administered the Convention before its ratification. PICAO therefore functioned for 20 months during which it successfully garnered 50 contracting states before it was formally replaced by ICAO on April 4, 1947 (Memorandum on ICAO,1994).

During the Conference on International Civil Aviation, opinions on the structure of post war civil aviation and the authority of ICAO varied considerably. Working in concert with each other, Australia and New Zealand proposed international ownership and control of global trunk routes.[3] The United States championed an "open skies" regimen in international air carrier service and free competition among air carriers. Great Britain advocated orderly and controlled development of international air carrier service. In the absence of compromise between Great Britain and the United States, the conference could not establish a strong regulatory body. Instead, it established a limited technical body tasked primarily with standardizing operations and the technical development of international civil aviation (Kihl, 1971).

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[3]Trunk routes referred to long distance routes between large cities or major population centers.

The Chicago Convention of 1944

The Chicago Convention comprises 96 articles designed to; "develop the principles and techniques of international air navigation and to foster the planning and development of international air transport" (Memorandum on ICAO, p. 1966); establish the privileges and restrictions of all member states; provide for the adoption of International Standards and Recommended Practices (SARPS) to regulate air navigation and facilitate air transportation by fulfilling tasks necessary to "meet the needs of the peoples of the world for safe, regular, efficient and economic air transport, encourage the arts of aircraft design and operation for peaceful purposes, encourage the development of airways, airports, and air navigation facilities for international civil aviation, prevent economic waste caused by unreasonable competition and avoid discrimination between Contracting States" (Memorandum on ICAO, 1996, p.13).

An issue of considerable importance at the Chicago Conference pertained to the exchange of commercial rights in international air service. Divergent opinions on this subject rendered a satisfactory solution impossible. A workable compromise was however finessed through two agreements, namely; the International Air Services Transit Agreement (a.k.a. Two-Freedoms or Transit Agreement) and the International Air Transport Agreement (a.k.a. Five-Freedoms or Air Transport Agreement). The Two-Freedoms agreement which called for the right of transit over foreign territory and the right to land in foreign territory for non commercial purposes enjoyed wider acceptance than the Five-Freedoms agreement which called for the right of commercial service between signatory states. By December 1992, a hundred nations had signed on to the Two-Freedoms agreement and only eleven had accepted the more commercially extensive Five-Freedoms agreement (Memorandum on ICAO 1994).

Failure of the Chicago Convention to secure wider acceptance for both Agreements was a fairly significant setback for the rather lofty functionalist aspirations of the Conference. Rejection of the Air Transport Agreement implied that international air service between each set of two nations would have to be carried out under the terms of bilateral agreements between respective nations, instead of the anticipated global multilateral agreement applicable to all contracting nations. Today, bilateral agreements completely govern the international arena of air transportation and multilateral agreements remain a rarity (The Convention on International Civil Aviation, 1991).

Over the years, ICAO has successfully developed and adopted 18 technical Annexes to the Chicago Convention which deal with aeronautical communications, air navigation, air worthiness, environmental protection and security, meteorology and operations. Of the 18 technical Annexes, 17 are within the air navigation field (Memorandum on ICAO,1994). Implementation of these Annexes through SARPs has successfully produced an appreciable degree of technical uniformity which has fostered safety and efficiency in international aviation. The Annexes and their SARPs serve as ICAO's main administrative tools. Failing to secure the sweeping mandate to govern international aviation that it had originally anticipated at the Chicago Conference, ICAO has successfully managed to evolve into a fairly effective technical body promoting intergovernmental cooperation in international civil aviation.

ICAO's Operational Structure and Function

At the invitation of Canada, ICAO established its headquarters in Montreal. ICAO however maintains regional offices in Bangkok, Cairo, Dakar, Lima, Mexico City, Nairobi and Paris. Issues of a regional nature, are generally addressed in a customized fashion by each of the nine regions of ICAO. Within the nine regions are 183 contracting nations (as of 2/20/94), a significant increase from 41 members on July 1, 1947. The sovereign body of ICAO is an Assembly of all contracting nations which meets at least once every three years as convened by the Council. The Assembly democratically adopts policies, binding standards and procedures, sets directional guidelines for the entire organization and elects representatives from 33 contracting nations[4] to serve three year terms on ICAO's Council which is in permanent session. The Council governs all functions of ICAO under the leadership of a president.[5] The permanent Council exercises oversight over four additional organs of ICAO, namely; the Air Navigation Commission, Air Transport Committee, the Committee on Joint Support of Air Navigation Services and the Finance Committee.

A major responsibility of the Council involves recommendation of SARPs and subsequent incorporation as Annexes into the Convention on International Civil Aviation. The Council may also serve as an arbiter between member states on issues pertaining to international air service or implementation of organization policies. Through its headquarters facilities, the Council convenes several professional meetings on aviation and serves as a forum for interaction between policy makers and international experts on different aspects of aviation. Participating in ICAO meetings are representatives and experts from other specialized agencies of the UN such as ITU, UPU and WMO as well as nongovernmental organizations (NGOs) including Airports Council International (ACI), American Association of Airport Executives (AAAE) and Airline Pilots Association (ALPA). In addition to the SARPs, ICAO also formulates Procedures for Air Navigation Services or PANS (operating practices with detailed information) which amplify the SARPs for implementation purposes. To facilitate effective implementation of SARPs at the regional level, ICAO develops Regional Supplementary Procedures (SUPPS) for adoption and implementation on a regional basis. After standards are adopted by ICAO, they are put into effect by each contracting state.

Assisting the Council in its work is a Secretariat which could be divided into the three areas of; professional personnel, language staff personnel and clerical or support staff personnel. Most employees of the Secretariat are nationals of contracting states with fairly extensive commercial air transportation services such as Great Britain, France, Canada and the U.S.

Notwithstanding its highly technical focus and mission, ICAO's functions are not apolitical as would be expected under functionalism. Political conflict emerges when there is a clash of economic and national interests among nations (Kihl, 1971). Absence of the Soviet

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[4]The original number of Council Member States was 21; this number was increased to 27 through an amendment in 1962, and to 30 in 1973. The number of Council members was increased to 33 in 1980 at the 21st Session of the Assembly held in Montreal in Sept.- Oct., 1974. In October, 1990 the 28th Session (Extraordinary) adopted an amendment to increase the number of Council members to 36. This amendment is not yet in force.

[5]Edward Warner, professor of aeronautics at MIT, and the first person to hold the Council's presidency, was successful in competently sheparding the Council through its nascent years.

Union throughout most of ICAO's life has spared it the political gridlock which paralyzed most UN action till the end of the cold war. In spite of the absence of insurmountable ideological differences, ICAO faces several conflicts among the competing interests of several actors. As a functional organization, ICAO however manages to serve both as an "arena for conflict and as a workshop for collaboration" by constant "attempts to minimize the conflictual and maximize the cooperative aspects of international relations" (Claude, 1964 p. 14). That ICAO has enjoyed success may be beyond debate. International air travel continues to flourish as is demonstrated in the following chart (Table 1) of passengers carried in the ten year period between 1984 and 1993.

Table 1
Global Passenger Count (millions) and Freight (Tonnes) Each Year: 1984-1993

Year	Passenger Count	Total Freight in *Tonnes*	Passenger Load Factor	International Passengers	International Freight
1984	848	13.4	65%	185	5.8
1985	899	13.7	66%	194	5.9
1986	960	14.7	65%	198	6.4
1987	1,028	16.1	67%	222	7.2
1988	1,082	17.2	68%	243	7.8
1989	1,119	18.2	68%	262	8.6
1990	1,165	18.3	68%	280	8.9
1991	1,134	17.4	66%	266	8.5
1992	1,156	17.3	66%	299	9.3
1993 (est.)	1,166	17.5	66%	317	9.7

Source: ICAO (December, 1993) quoted in *Memorandum on ICAO* 1994 pp. 38, 39

Functionalism's Failures and ICAO

The experience of ICAO may suggest that the fundamental assumptions of functionalism may be theoretically plausible but its practicality may, however, be doubtful, if not dubious. Among the assumptions of functionalism is the premise, or belief, that human affairs can be neatly stratified into layers, thus socioeconomic problems can be neatly dissected from political problems. The experience of ICAO has shown that the socio economic interests of contracting nations evolve into adamant political positions on issues before ICAO (Kihl, 1971). The higher the stakes involved in a dispute over socioeconomic issues, the more complete the metamorphosis of socioeconomic issues into political positions at ICAO. Other scholars have contended that "the artificial dissection of organic economic ties into separate economic organizations under independent authorities endangers viability" (Bebr,1953 p. 42).

As previously stated, functionalism's canon of transferability assumes that cooperative skills acquired through collaborative work on technical issues under the auspices of functional agencies can be transferred to develop collaborative solutions at the highest political levels (Claude,1971). This expectation is achievable and sound under altruistic circumstances. Altruistic circumstances however tend to be the exception than the rule in politics, especially political interaction between state actors at the international level. National self-interest tends to subsume altruistic behaviour among state actors primarily because the ultimate responsibility of state actors is the security of their respective subnational constituencies. Pursuit of the security interests of state actors always has the potential of colliding with similar pursuits by other states. The political positions held by the Allied nations who formed ICAO were clearly the result of attempts to respond to the parochial interests of each contracting state's citizenry. When these interests collided, ICAO took refuge as a technical body with limited responsibilities instead of a powerful IGO with broad regulatory authority to govern the international air transportation system.

Of the hypotheses espoused by functionalism, the most radical is the assumption that human loyalties will be transferred from the nation state to transnational functional agencies as the efficacy and effectiveness of those agencies become evident. It is not wrong to assume an increase in allegiance to effective functional agencies. Judging by the level of participation in its activities, ICAO's successes have won it allegiance among the ranks of the international air transportation community. It may however be inaccurate to assume or expect the increase in allegiance to be either permanent, or at the expense of nation states. Among the several contentious issues in the life of ICAO that soundly confirm this assertion, one warrants narration in this paper to substantiate this point.

In response to an increase in trans Atlantic traffic, from 90 propeller-driven airplanes a day in 1956, to 220 airplanes (85%of which were jets) a day in 1966, ICAO reduced the required lateral separation between aircraft from 120 miles to 90 miles, effective January 13, 1966. The change was to affect transoceanic air corridors which begin about a 100 miles from shore and end a similar distance from shore. With US support, this measure passed the ICAO Council with a vote of 18 to 0 and 4 abstentions.[6] An NGO, the International Federation of Airline Pilots Associations (IFALPA) vigorously opposed the rule imposed by ICAO- an IGO, and requested that ICAO suspend the new rule till further studies were completed (*New York Times* 1/9/66). ICAO naturally refused but was ultimately compelled to abandon the new rule primarily because of pressure from the US Government through the FAA on behalf of ALPA, the domestic counterpart of IFALPA. So whereas ALPA had championed other ICAO decisions in the past, it did not hesitate to turn to its national government when it was in ALPA's perceived interest to do so. Despite its initial vote for the new rule, the US government did not hesitate to switch sides on this issue when the loyalty of its citizenry was at stake.

Recent events in international politics suggest that, in the logical interest of self preservation, nation states would not idly watch as support for their governments gets transferred to functionalist international entities. Recent events in Somalia constitute a tragic, yet prime example. In an environment where the quasi governmental entities, the clans, could

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[6] The member states who abstained from this vote were Belgium, India, Spain and Great Britain. The United States cast a firm vote in support of this policy change. At present, the lateral separation for aircraft traffic across the North Atlantic ICAO Region is 60 nautical miles for supersonic aircraft above FL 275 and aircraft which meet the Minimum Navigation Performance Specification (MNPS) Airspace and 90 nautical miles between the U.S., Canada, Bermuda and points in the Caribbean ICAO Region (7110.65J Air Traffic Control 1995 8-7-1).

not provide for the social welfare and survival needs of their kin, they allowed NGOs under the auspices of the United Nations to intervene and assist but they retained their emotional hold on the allegiance of their clansmen who were ironically saved from starvation by the NGOs to later fight for their clans. In an even more powerful commentary on the flaws in functionalism's assumption about the transferability of allegiance, some of the Somali clansmen who were saved from death by starvation, took up arms against the NGOs who had saved them when it was in the political interest of the clans to do so.

Summary and Conclusion

Functional agencies and alliances are formed for limited purposes and objectives. As such, they last as long as needed to accomplish certain accepted objectives, not to transfer allegiance or sovereignty. ICAO was formed to improve international air transportation services. The need to improve international air transportation services persists fifty years after the Chicago Convention, so ICAO enjoys both a legitimate mandate and appropriate support. As a functional agency which is transnational in structure and function, ICAO will receive the support of several sub-national entities so long as it fulfills its ascribed role in facilitating the development of international air transportation. ICAO will enjoy loyalty and even some allegiance from sub-national entities as it does its work. The loyalty and allegiance from the sub-national entities will however be transient and equally "functional" because ICAO offers neither citizenship nor nationalistic belonging. Allegiance to ICAO is, therefore, dependent upon its continued function as a collective agency for developing international aviation.

If rules are the norms and standards governing the behavior of actors in society, then ICAO has done well because most of the technical standards it develops or stipulates are accepted as rules and implemented by its member states. Future challenges and the escalating demands of its member states will ensure ICAO's continued viability as a functional agency. It would however be a mistake to ascribe to ICAO, or any other functional agency, the status of a nation. In ICAO, there is neither the *consensus* prescribed by Niebuhr (1949) and Morgenthau (1962), nor *coercive* force required for cohesion in a political system prescribed by Hobbes (1967) and Dahrendorf (1959, 1968). The "link between authority and activity," and the subsequent "breakaway from the traditional link between authority and a definite territory" (Mitrany, 1966 p. 27) has not occurred among the members of ICAO. Neither has sovereignty been transferred through function at ICAO after fifty years of relative success. From the preceding discussion of functionalism and the first fifty years of ICAO, it is clear that functionalism is an apt normative philosophy in the theory of international relations and politics. However, functionalism is neither descriptive, prescriptive, nor representative of the present international political system. There may however still be a remote chance that the next fifty years of ICAO will produce another verdict on the viability of functionalism's predictions.

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STUDENT PERFORMANCE IN A TECHNOLOGY-ENHANCED AVIATION METEOROLOGY COURSE

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Abstract

In recent years, as the presence of technology in the classroom increased, methods for using technology also increased, but at a much slower pace. With this in mind, this study looked to current educational theory for an effective way of employing computer technology in the aviation meteorology classroom. One method that showed promise consisted of coupling technology with advance organizers. Advance organizers are pertinent introductory materials presented to students prior to formal instruction. Their purpose is to provide cognitive anchorage for the ideas that follow in subsequent instruction. In the past, advance organizers have met with mixed success, however, recent research shows that when properly constructed, they can be very effective in increasing students' academic performance. In this study, the effectiveness of computer technology as a means to present advance organizers was studies. The sample consisted of 67 students who received the advance organizers either by technology via computer monitors or by paper hard copy. Students were statistically matched and data were analyzed using multiple analysis of covariance (MANCOVA) and follow-on univariate analyses of covariance (ANCOVA). In this study, statistically significant results showed computer technology to be effective in increasing performance among aviation meteorology students.

Introduction

As the use of technology has increased in many areas of education, the methods for using it have also increased, albeit at a much slower pace. Initially, computer technology was used as an efficient method of practice and repetition (Clark, 1985). Today, new methods include simulation and data sharing (Newman, 1990; Semrau & Boyer, 1994). Semrau and Boyer (1994) recommend using technology to examine data, interpret them, and look for trends in the data. On the whole, however, few new ideas for integrating technology into the college classroom have been implemented and a great need remains for new models to provide guidance for the effective implementation of technology (Senechal, 1991).

In an attempt to find an effective method of integrating computer technology in the meteorology classroom, applied recent advances in educational theory in a controlled, quasi-experimental study. In this study, the impact routine use of available technology can have on students' understanding of basic aviation meteorology was studies. The method explored was the use of technology to present advance organizers. An advance organizer consists of introductory material presented to students prior to formal instruction (Ausubel, 1960). These advance organizers then provide the cognitive anchorage for the more detailed concepts that follow.

Prior to the current research, a pilot study was conducted. That study provided evidence that computer technology, when used in the aviation meteorology classroom, had a positive effect on student outcomes (Witiw & Horton, 1996). The pilot study, however, did have limitations. No treatment was given to the control group and the experimental group was quite

small (n = 5). Because the results of the pilot study were encouraging, the research proceeded with a larger, more comprehensive study where the following research questions were developed: Do advance organizers presented through computer technology enhance students' factual knowledge, conceptual knowledge or problem solving ability? If an increase in knowledge is initially observed, does it persist with time?

Technology and Advance Organizers

Meng and Patty (1991) compared two types of advance organizers by employing computer-assisted instruction techniques. Their experimental study tested achievement on immediate and delayed post-tests with subjects grouped by learning styles, Mayer tested advance organizers (1979) and conceptual models (1989) and found varying degrees of success depending upon whether knowledge was factual, conceptual or problem-solving. Building on this previous work, this research investigated two types of advance organizers that were identical in content but were different in the type of media used to present them. Experimental groups had access to displays on video monitors provided through computer technology, while the control group received printed charts similar to those available for many years in the meteorology classroom.

Significance of the Problem

Though computer-assisted instruction has been used for many years, only recently has its use gone beyond drill and practice (Clark 1985,1991). Because no experimental research has addressed the appropriateness of different methods of using technology in the meteorology classroom, one goal of this study was to implement, test, and validate one method for doing so. It was hoped this would result in a definitive strategy for using technology to enhance students' understanding of basic aviation meteorology.

Ever since Ausubel (1960) introduced the idea of advance organizers, controversy has existed as to their utility and their most effective use. Development in the use of advance organizers matured with the work of Mayer (1989) and Meng and Patty (1991). Coincidentally, innovative ideas for the use of technology were put forth by Ellis (1992) with his suggestion of using technology as a dynamic means to present advance organizers.

The advance organizers developed for the current study were modeled after Mayer's (1979, 1989). He explored illustrative advance organizers and the types of knowledge they enhance. He saw usefulness in illustrative advance organizers especially when presenting technical concepts and particularly when the knowledge concerned was other than factual. Mayer's work followed a period when much work was being done with advance organizers, but with widely varying results (Barnes & Clawson, 1975). Mayer (1989) found the advance organizers he used effective in improving a student's conceptual knowledge and problem-solving ability. He reached success when he adapted one type of advanced organizer to a specific situation. Mayer insisted that organizers, or conceptual models (a term he later adopted) must be complete, concise, correct, and conceptual.

This research also had a strong basis in Meng and Patty's (1991) work. Meng and Patty not only compared the effectiveness of different types of advance organizers, but also incorporated cognitive styles and longevity of effects into their study. They compared two types of advance organizers and tested their short and long-term effectiveness. Their approach added experimental rigor by ensuring all participants received a treatment. Similar to Meng and Patty, two types of advance organizers were compared. Also investigated was their work of

looking at the effects of organizers after a fixed amount of elapsed time. The study built upon past research related to advance organizers (Ausubel, 1960; Corkill, Bruning, & Glover, 1988; Mayer 1979, 1989; and Meng & Patty 1991).

Over the years, other researchers have broadened Ausubel's original definition of an advance organizer by defining and testing different types of organizers. Several studies have shown that properly constructed advance organizers can be either abstract or concrete; verbal or illustrative (Corkill et al., 1988; Kloster & Winne, 1989; Meng & Patty, 1991). With this in mind, the type of organizers used in the current study approximated many of the newly defined types. The information presented to current research subjects consisted of illustrative (not written) advance organizers that were delivered via technology (Meng & Patty, 1991). Because the information relied upon specific events, these events fit Corkill et al.'s description of concrete organizers or what Ellis (1992) termed micro-events. They also closely parallel what Mayer (1989) termed models in that they were concrete, concise, and demonstrated the relationship between different elements of a system. Finally, an instructional technique described by Cobb (1994) as theoretical pragmatism was utilized. This paradigm draws on the work of Ausubel, Piaget, constructivism, and Vygotsky's social cognitive development. By using an advance organizer as a focus, students were permitted to explore their own concepts prior to instruction.

Specifically, the advance organizers or micro-events (the term these researchers used when referring to technology-displayed data) consisted of geographical maps with weather data superimposed, vertical atmospheric data profiles, and surface weather observations. For example, a micro-event on fronts displayed a surface chart, several upper level atmosphere charts, radar displays, satellite imagery, and current surface weather observations for several reporting stations.

This research predicted that combining technology with advance organizers would promote increased overall course success as well as higher levels of success in the conceptual and problem-solving aspects of aviation meteorology.

Methods

Subjects

This experiment took place at Florida Institute of Technology where aviation meteorology is a required course for all students entering the aviation program. The course usually is completed during the first semester of freshman year. The accessible population (n = 67) included all students enrolled in this course during a single semester. This university's aviation program draws students from across the United States as well as internationally.

Three intact sections, as assigned by the university registrar, ranged from 21 to 24 students each. These sections comprised the control group (n = 24) experimental group 1 (n = 22) and experimental group 2 (n = 21).

Instruments

Five paper and pencil tests were used in this study and consisted of multiple choice and free-response items. Standardized rubrics were used to assess the open-ended answers. Questions were designed with help from the test bank included in the Instructor's Manual to Accompany Essentials of Meteorology (Ahrens, 1993). A pretest was administered prior to

instruction. Its results were used as a covariate in the statistical analysis. Test one covered the first three weeks of instruction. Its primary use was to determine an appropriate test length and the suitable number of multiple choice and open ended questions. Test one results were not incorporated into the statistical analysis. Tests two, three, and four each contained 33 scored items, and each was administered during a 50-minute classroom period. Twenty-one of the items on each test were multiple choice questions, or required a specific short answer. The remaining 12 items derived from six opened-ended questions, each of which contained two dichotomously scored items.

The second, third and fourth tests covered the material presented in each of three, three-week periods. Treatments took place during the last two of these periods, with tests administered following each three week period. All three sections were tested on the same days. The comprehensive final examination was administered following course completion in accordance with the university-published final examination schedule. This occurred seven weeks after completion of the first treatment period, and four weeks after completion of the second treatment period. The final examination included 75 scored items, derived from 47 multiple choice or very short answer questions and 14 open ended questions, each of which contained two scored items. About 50 percent of these questions had appeared previously on tests one through four. The final exam was administered in a two hour period.

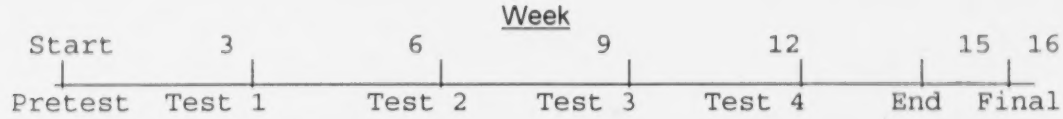

Figure 1. Timeline of testing schedule. Semester ended after Week 15. Final examination took place during Week 16.

The delayed post-test, which was incorporated into the final was designed with the work of Meng and Patty (1991) in mind. They found differences in achievement between measurements made immediately after treatment and those that were delayed. The intent was to test the persistence of treatment effects.

Design

This research used a quasi-experimental approach with a control group (n = 24) and two experimental groups (n = 22, 21). A pretest, two immediate post-tests and a delayed

Table 1
Treatment Schedule

Group	Weeks 1-6	Weeks 7-9	Weeks 10-12	Weeks 13-15
Experiment 1	Identical	Treatment	Treatment	Identical
Experiment 2	Identical	Control	Treatment	Identical
Control	Identical	Control	Control	Identical

post-test. A post-test followed each of two treatment periods were administered. The delayed, comprehensive post-test followed the termination of all treatment. The first experimental group (n = 22) received micro-events during both treatment periods. The second experimental group (n = 21) only received treatment during the second treatment period (Table 1). Analysis of covariance provided the control for pre-existing differences among groups.

Procedures

The course curriculum, syllabus, and assignments were identical for all three groups. The lecture format used during the first six weeks of the course was identical for all groups. The second six weeks consisted of the treatment periods. Content for all lectures and labs were identical during this time. For the lab periods, however, the media used varied.

The students completed five tests. Scores from tests three and four and the final exam were used to compare success among the three groups. Tests one and two were administered prior to the treatment periods. Test one provided the necessary information to gauge the appropriate number of questions for subsequent tests, and it sensitized students to the type of questions to expect. Test two scores provided a covariate.

The experimental treatment consisted of micro-events introduced via technology by the instructor during a laboratory period. Labs preceded the formal presentation of related material introduced during the lecture portion of the course. Examples of micro-events included frontal systems and air masses, severe weather and tropical weather. Control groups received hard-copy versions of the micro-events (advance organizers). These consisted of charts and alpha numeric data rather than the computer based versions. The control group received information identical to that contained in the micro-events. Micro-events and advance organizers were based upon current meteorological conditions. The content for a particular session addressed material that was presented by lecture during the next two to three classroom periods. For example, various charts showed how the cold front looks at the surface, and how it looks aloft, as well as its relation to the jet stream and individual surface observations and forecasts. A subsequent lecture, using several meteorological charts, addressed the actual physics of a cold front. Each chart included data from a different level of the atmosphere. These levels extended from the surface of the earth to high in the atmosphere. All sections had an equal amount of laboratory time--25 minutes per session.

Each week, each section viewed a micro-event (advance organizer for the control), such as the situation surrounding a frontal system or a severe weather event. The data were actual real-world and recent. Discussion commenced when the students completed viewing all components,. The discussions were based upon instructor-led questions. At the end of the lab period, the instructor asked the class for any conclusions based on the exercise.

Data Analysis

A quasi-experimental approach with one control group and two experimental groups and a pretest provided the data for analysis. Multiple regression correlation helped to determine predictor variables and to statistically match the groups. Covariates entered as a set included math and verbal SAT scores, high school GPAs, pretest scores, and the scores of a test administered prior to the commencement of the experiment. Significance testing of the semi-partial correlation coefficient was used to test the significance of the group membership for each of the experimental groups. A multiple analysis of covariance (MANCOVA) allowed adjustment of post-test scores for differences in the covariates. It also helped control Type I

error rates for the six outcomes being tested. The analysis included follow-up ANCOVAs for significant main effects.

To ensure statistical rigor, an initial significance level of .05 was used as well as a power of .80. Effect size was calculated using effect size index. To meet the significance level and power requirements for n =67, the minimum required effect size index for addition of the two group membership variables was .151.

Results

Of the many multivariate statistical techniques available, multiple analysis of covariance (MANCOVA) is the preferred method when covariates are present and the significance of group membership is being tested (Tabachnik & Fidell, 1989). MANCOVA, therefore, served as an omnibus test to evaluate the relationship between treatment group membership and the dependent variables. Where this relationship showed initial significance, additional follow-on univariate analysis of covariance (ANCOVA) computations were done.

Significance of Covariates

As a set, the covariates were significant for all dependent variables at the .05 significance level (Table 2). Additionally, the minimum effect size index, f^2 was calculated to be .82, and power exceeded .99 in the model for all dependent variables.

Table 2 shows that, as a set, the covariates contributed a significant amount of the variance for each of the dependent variables tested. The model, therefore made adjustments for the initial differences between subjects. Furthermore, as seen in Table 2, when group membership was entered as a set, the set contributed a significant portion of the variance for four of the six dependent variables being studied.

Follow-on ANCOVAs

Follow-on ANCOVAs, in a protected F-test, were made for the four dependent variables (IPT, CPT, CON, and PROB) the MANCOVA analysis indicated were significant. For these four dependent variables, group membership was a significant factor in the omnibus test. As described by Haase and Ellis (1987), significance levels in these follow-on tests were adjusted for the number of tests being accomplished. As a result of the four follow-on tests, the new alpha level calculation equaled .0125 (.05/4). Table 3 presents the four follow-on, univariate ANCOVAs for group membership. The critical F value for these calculations (df = 2,59) was determined to be 4.87.

As seen from Table 3, results of the initial post-test and conceptual knowledge were significant at an alpha level of .0125.

Table 2
Hierarchical Cumulative R^2 Analysis for the addition of group membership in the MANCOVA Model

IV Set Added	df	cum.R^2	I	F
Initial Post-test				
Set A (covariates)	5,61	.450		9.99**
Set B (group membership)	2,59	.553	.103	7.03*
Delayed Post-test (DPT)				
Set A (covariates)	5,61	.546		14.68**
Set B (group membership)	2,59	.579	.033	2.39
Comprehensive Post-test (CPT)				
Set A (covariates)	5,61		.543	14.48**
Set B (group membership)	2,59	.606	.063	4.87*
Factual Knowledge (FAC)				
Set A (covariates)	5,61	.464		10.57**
Set B (group membership)	2,59	.505	.041	2.52
Conceptual Knowledge (CON)				
Set A (covariates)	5,61	.545		14.36**
Set B (group membership)	2,59	.620	.075	6.02*
Problem Solving (PROB)				
Set A (covariates)	5,61	.563		15.72**
Set B (group membership)	2,59	.607	.044	3.41*

Note n = 67
*p < .05; **p = .0001

Table 3
Follow-on Univariate ANCOVAs of the Comprehensive Post-test, Initial Post-test, Conceptual Knowledge, and Problem-Solving Ability

Dependent Variable	df	Univariate F
CPT	2,59	4.72
IPT	2,59	6.79*
CON	2,59	5.82*
PROB	2,59	3.30

Note: n = 67 *p < .0125

Table 4 shows the effect size indices and power calculated for the addition of group membership for the two dependent variables showing significance.

Table 4
Effect Size Indices for Group Membership of Initial Post-test, and Conceptual Knowledge

Dependent Variable	df	f^2	L	Power
IPT	2,59	.261	15.4	.95
CON	2,59	197	11.6	.87

Note: n = 67

Therefore, the results of this study indicated that computer technology, when used to present concepts prior to formal classroom instruction, had a significant, positive effect on the students' conceptual scores as well as on scores on post-tests administered immediately after periods of instruction.

Discussion and Conclusions

Discussion of Results

In this study, research questions were developed that were based upon the work of these previous investigators. Following Mayer (1979, 1989), the relationship of the use of technology and a student's factual, conceptual, and problem-solving knowledge was explored. Meng and Patty (1991) provided the basis for the study of the relationship between using technology and students' success on immediate, delayed, and comprehensive post-tests.

Factual knowledge, conceptual knowledge, and problem solving ability. The effect of presenting micro-events via computer technology on the three types of knowledge as part of the omnibus MANCOVA, and follow-up univariate ANCOVAs was explored. Of factual and conceptual knowledge as well as problem-solving ability, statistically significant positive results

were only found concerning conceptual knowledge. These were in a positive direction in favor of technology.

Immediate post-tests, comprehensive post-tests, and delayed post-tests. As part of the omnibus MANCOVA, the longevity of the effect of treatment was tested. Scores were assigned to appropriate combinations of post-tests. To test any immediate or short term effect, one score was assigned to the sum of the scores of the two tests administered immediately after the treatment periods (IPT). Another score was assigned to the number of correct answers a student obtained on the part of the final examination that was applicable to the treatment period (DPT). Finally, a separate score was assigned to represent the sum of the IPT and DPT scores (CPT). Statistically significant results were found only for the immediate post-tests. Again, these results were in a positive direction in favor of the use of technology.

Conclusions

For the students involved in this study, the use of technology to present illustrative advance organizers proved effective in increasing their conceptual knowledge of basic aviation meteorology. Additionally, this use of technology also proved effective in significantly increasing students' knowledge of basic aviation meteorology when this knowledge was tested immediately after treatment periods.

Statistical testing of any effect the technology may have had on the students' factual knowledge or problem-solving ability was inconclusive. Likewise, any long-term effect of the treatment was not shown to be statistically significant in this study.

Future studies are needed that more completely incorporate the cognitive style or aptitude of the learner. This project would help determine the type of student for which technology is most effective. A large sample consisting of a broad spectrum of past performance and aptitudes would be required.

This study was inconclusive concerning the effect of technology on factual knowledge and problem solving ability. To more thoroughly investigate these areas an experimental study should be conducted over a longer period of time than a six week period. Long term persistence of any treatment effects should be studied. This study indicated the strongest effects to be in the near term. Although the delayed effect for the treatment remained positive, the lack of statistical significance prevented any firm conclusions. A longer term, larger study might determine the relationship of performance and elapsed time since completion of treatment.

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EDUCATIONAL REQUIREMENTS FOR A CAREER IN AIRLINE MANAGEMENT: AN INDUSTRY PERSPECTIVE

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Presidents at thirty of the top United States airlines were asked to indicate what educational preparation they felt students seeking a career in airline management should possess. They were asked to rate 18 courses offered in the Aviation Management baccalaureate degree curriculum at Southern Illinois University at Carbondale. They were also asked to rank 14 suggested courses from the Council on Aviation Accreditation (CAA) Curriculum Guideline. Following analysis, courses were placed in three categories: Inclusionary, Exclusionary and Uncertain/Diverse.

Findings indicate that airline presidents place the greatest value on courses stressing fiscal requirements, legal aspects, airline operations and operating in a global environment. Conversely, courses including Applications of Technical Information, The National Airspace System, Airport Planning, Airport Management, Professional Development and General Aviation Operations were ranked low in importance.

Introduction

The aviation industry has evolved into a complex enterprise (Adamski & Doyle, 1993). Coincidentally, aviation education programs (Johnson & Lehrer, 1995) now exist in many technical schools, colleges, and universities throughout the United States. Bachelor degree programs in aviation are offered by scores of large universities. In recent years, baccalaureate and graduate programs have been established to meet increasing demands of industry and government. Despite proliferation of undergraduate aviation programs and a growing number of graduate degrees in areas of aviation, but for a course offered in graduate airline education (Concordia, 1993), there seems to be no established program directed toward the needs of the educational requirements for a career in airline management.

Emerging global market dynamics have caused the aviation industry to elevate entry-level employment qualifications for both engineering and non-engineering personnel. Many employers require degrees in addition to aviation certification for entry level positions. So pervasive has this demand become in recent years that 94% of new hire pilots employed by major and national airlines hold baccalaureate or higher degrees. Certification alone was deemed sufficient for most positions only a few years ago. For many aviation related positions, employers prefer business knowledge and training, language and communications skills, and fundamental knowledge and understanding of the broader socio-economic global system of which the aviation industry is a major element (Kaps, 1995).

Profound changes are taking place in the aviation industry. Privatization, globalization and liberalization in the form of reduced government regulation are placing challenging demands on industry managers as they strive for improved productivity, quality and profitability. This new market environment, coupled with massive financial losses, has forced air carriers to re-define core business objectives and reshape work forces to reflect and support these objectives. A survey (Johnson & Lehrer, 1995) conducted among collegiate aviation educators to define curricular subject matter in aeronautical/aerospace programs indicated a strong need to present business and business related subjects.

Statement of the Problem

Preliminary research indicates there is no body of literature that addresses specific educational requirements for a career in airline management.

Methodology

In an attempt to define airline curricular necessities, curricular components of an established and functional aviation undergraduate program and guidelines promulgated by the University Aviation Association accrediting body were used as the established range. To facilitate this goal a two part research method was established. This consisted of a two part Delphi survey coupled with replicated statistical investigation of curriculum components.

Survey Format

The objective of Delphi technique is to obtain consensus opinions without bringing individuals together in face to face meetings. This is achieved by a series of questionnaires interspersed with controlled opinion feedback.

There are three Delphi forms generally used in an educational setting. The first, the Normative or Consensus Delphi, is designed to gather expert opinion of specified issues from a defined group of experts. Exploratory Delphi is a method of eliciting expert opinions about the probability, desirability and impact of future events. The third is the Focus Delphi which gathers opinions from diverse groups that will be affected by a projected program or policy.

The Delphi Technique is considered a quasi-qualitative research method (Rojewski, 1990). Delphi has been consistently employed to gather expert opinion and thought on how higher education can improve education programs. The Delphi technique is an applicable tool for educational research and curriculum development (Volk, 1993). The Delphi process is a method of achieving statistically derived group consensus, forecasting, or problem solving by having a group complete a series of questionnaires (Helmer, 1966).

Questionnaire Design

The questionnaire was composed of two distinct parts. Part I consisted of the eighteen curriculum statements relating to specific aviation management courses offered by Southern Illinois University at Carbondale (SIUC). Each statement defining the specificity of the particular course, was followed by a ranking mechanism. Thus, each statement contained a curriculum component title, brief course description and a Likert scale.

Identical in design as Part I, Part II contained fourteen generic courses recommended by the Council on Aviation Accreditation (CAA) for an aviation management curriculum. Since these course titles contain no indication of content by the CAA, a possibility of overlap and duplication to Part I may exist. Respondents were thus asked to evaluate courses presented in Part I and Part II independently. The CAA guidelines are not intended for an Airline Management curriculum and are therefore purposely generic.

The Likert scale used in this study represented degrees of importance assigned to the eighteen SIUC curriculum statements and the CAA aviation guidelines. The Likert scale was used to allow respondents to indicate the extent to which they believed curriculum statements

were important to a career in airline management. The Likert scale was selected because of simplicity and ease of use.

Respondents were instructed to rank the importance of each curriculum statement using a five point Likert scale. The questionnaire contained no open-ended questions that allowed respondents to justify or elaborate their rankings. Kaufman and English (1979) suggested that a prepared list of items may erode the creativity, however, a prepared list does provide comprehensive data when validated by expert opinion.

The following are descriptions of the 18 SIUC Aviation Management courses cited in this study (SIUC Undergraduate Catalog, 1995):

Work Center Management. A study of the problems of managing a small working unit (division, department, work center, section, etc.) within a larger unit (agency, company, regional office, etc.) Included items will be work center goals identification, staffing needs, monitoring of work process reporting, work center communications, and interpersonal relations within the work center.

Applications of Technical Information. This course is designed to increase student competence in analyzing and utilizing the various types of technical information encountered by managers in technical fields.

Labor-Management Problems/Aviation Labor Relations. Students will gain a general understanding of the economic situation of which labor-management problems represent a subset. They will develop a perspective on the evolution of labor relations in the United States economy and on how the interaction of labor and management differs throughout the world. The collective bargaining section introduces the student to the techniques of bargaining used by labor and management in their ongoing interactions.

Data Interpretation. A course designed for students beginning their major program of study to examine data use in their respective professions. Emphasis will be placed upon an understanding of the basic principles and techniques involved with analysis, synthesis, and utilization of data.

Professional Development. Introduces students to the various elements involved in obtaining a position in their chosen career field. Topics included are: personal inventories, placement services, employment agencies, interviewing techniques, resumes, letters of application, references, and employment tests. Each student will develop a portfolio including personal and professional information related to individual career goals.

The Air Traffic Control System, Procedures and Rules.. This course provides instruction in basic air traffic control procedures and phraseology used by personnel providing air traffic control services. Students will become familiar with Federal Aviation Administration handbook and federal aviation regulations that pertain to the operational responsibilities of an air traffic controller.

Airport Planning. To acquaint the student with the basic concepts of airport planning and construction, as well as an investigation of various regulatory agencies in the industry and their functions.

Aviation Industry Regulations. A study of various regulatory agencies of the industry and their functions.

Airport Management. A study of the operation of an airport devoted to the phases of lighting, fuel systems, field marking, field buildings, hangars, and surrounding community.
Airline Management. A study of the administrative aspects of airline operation and management including a detailed study of airline organizational structure.
General Aviation Operations. A study of general aviation operations including fixed base operations (fuel, sales, flight training, charter, etc.), corporate aviation (business aviation, corporate flight departments, executive air fleets, etc.) and the general aviation aircraft manufacturing industry.
Legal Aspects of Aviation. The student will develop an awareness of air transportation. The course will emphasize basic law as it relates to contracts, personnel, liabilities, and legal authority of governmental units and agencies.
Aviation Maintenance Management. To familiarize the student with the functions and responsibilities of the aviation maintenance manager. Maintenance management at the fixed based operator, commuter/regional airline, and national carrier levels will be studied.
Aviation Safety Management. This course will survey the various aspects of aviation flight and ground safety management. Weather, air traffic control, mechanical and human factors in aviation safety management will be reviewed.
Fiscal Aspects of Aviation Management. An introduction to the fiscal problems encountered in the administration of aviation facilities and airline operations.
Current Issues in Aviation Management. A review of current problems affecting the aviation industry with particular emphasis on resource allocation, planning, and internal and external constraints.
National Airspace System. This course provides instruction on the national airspace system, its purpose and major components. It defines the Federal Aviation Administration's role in the operation, maintenance and planning of the national airspace system.
Aviation Occupational Internships. Each students will be assigned to a departmentally approved work site engaged in activities related to the student's academic program and career objectives. The student will be assigned to an unpaid internship position and will perform duties and services in an instructional setting as previously arranged with the sponsoring work site supervisor. (pp. 104 & 105, 151 & 152)

The following 14 courses utilized in this study were derived from the 1990 CAA aviation management guidelines and at that time were solely identified by title without description.

Accounting	Aviation Legislation	Macroeconomics
Air Cargo	Business Law	Management I & II
Air Transportation	Data Interpretation	Marketing
Airport Management	International Aviation	Microeconomics
Aviation History	General Aviation Management.	

Note. 1990 CAA Aviation Management Guidelines.

Questionnaire Validity

The questionnaire was tested by three aviation educators for content validity, clarity of instructions and research focus. This method followed the procedure outlined by Ary (1985) to:

> ...have competent colleagues familiar with the purpose examine the items to judge whether they are adequate for measuring what they are supposed to measure and....whether they are a representative sample of the behavior domain under investigation. (p. 357)

Primary concern in the development of the questionnaire centered on consistency of interpretation of all terms used, document format and style. According to Best and Kahn (1986), the meaning of all terms must be clearly defined so that they have the same meaning to all respondents.

Selection of Interviewees

Thirty airline presidents were identified to request assistance in completing the developed questionnaire. Airline president identification was obtained from the World Aviation Directory (1994), which lists corporate members of each aviation and airline company. The criterion selected to determine the top thirty airlines for the purpose of this study was the totality of annual revenue passenger miles (RPMs).

Airline presidents were selected as the focus group to maintain a level of airline expertise. Balaraman and Venkatakrishnan (1980) stated,"when evaluating or investigating professional curricula, a panel must be drawn from those in similar professions." Leide (1977) wrote that the selection of experts should have as its major consideration "their professional competence" (p.171). Because of their background and responsibility, the identified executives are sensitive to career advancement associated with the airline industry. This is consistent with Dalky's (1972) views for expert identification and with Pratt (1980) who wrote:

> The experts whose assessment of the curriculum is sought need to be knowledgeable....be willing and encouraged to deliver a candid judgment....There is something to be said for having an assessment by disciplinary experts and curricular generalists. (p. 410)

Data Collection

Questionnaires were distributed in April 1995 to the thirty identified presidents of those United States airlines having recorded the highest revenue passenger miles. Twenty four usable surveys were returned. Each questionnaire contained a unique tracking number to allow the researchers to correctly identify respondents. The respondents were requested to complete the survey instrument using the following possible responses:

1	2	3	4	5
Not Important	Vaguely Important	Somewhat Important	Important	Very Important

A sixth category, "Don't Know", was included should the respondent be unable or choose not to rank a curriculum statement. Likert scales were used to allow the airline

executives to indicate the extent to which they believed a statement was important for a career in airline management. Data from the twenty-four respondents were gathered, and means and standard deviations were calculated.

Each respondent was contacted, over a four month period of time, to determine if they would once again respond to the same questionnaire, in light of the consensus which had developed. Each, either personally, or through their administrative staff, responded in the affirmative.

Survey 2

Distribution of the second questionnaire was accomplished in March 1996 in the same manner as the previous questionnaire. This questionnaire contained the original curriculum statements and Likert scale. Each participant's original ranking for each curriculum statement was superimposed for each of the eighteen SIUC curriculum statements and the fourteen generic CAA guidelines. In addition, the group's mean for each question was indicated on the questionnaire.

The twenty-four airline executives were requested to compare their previous individual responses with the mean responses generated by the original survey. Participants were asked to review their initial responses in keeping with the following instructions:

1. Read each Part I and Part II curriculum identifier, noting the original grouped mean and your superimposed individual rating from the original response.
2. Re-evaluate the original response in light of the emerging consensus (group mean) and,
    a. circle your superimposed original rating if your individual response has not changed.
    b. circle the group mean score if agreement exists with the group consensus.
    c. re-evaluate and circle another of the five choices.

Upon receipt of all twenty-four responses, data were evaluated and means and standard deviations were calculated.

Treatment of Survey Data

Survey 1 and Survey 2 responses were collapsed and analyzed as grouped mean ratings. Each curriculum statement was evaluated for consensus among respondents.

Consensus

To measure levels of consensus, mean scores were analyzed. Mean responses ranging from 4.0 to 5.0 (important to very important) were perceived as strong support for inclusion in an airline curriculum. Mean responses ranging from 2.50 to 1.00 (vaguely important to not important) were perceived as strong indications for exclusion as an educational requirement. Mean responses ranging between 2.51 and 3.99 were considered as too vague, or, not definitive enough to be considered for inclusion in an airline curriculum. Clasen and Dormody (1994) indicated that the discrete ordinal nature of each Likert scale point permits summarization of responses as counts, percentages or categories. Likert (1932) indicated that he never intended for the five point response alternatives to be the scale. Thus,

categorization permitted blending of like or similar responses and splitting the "Somewhat Important" category scores above and below the mean.

Stability

Stability was determined by two methods. The first consisted of percentage change in mean responses between the first and second survey results. Dajani, Sincoff and Talley (1979) stated that "consensus is assumed to have been achieved when a certain percentage of the responses fall within a prescribed range" (p. 83). Miller (1970) and Dajani, et al.(1979) indicated that a change of less than 15% was an indication of stability.

The second measure of stability compared the grouped standard deviations between the first survey and second survey. A decrease in standard deviation was a reliable indicator of stability and movement toward consensus. The standard deviation which is the square root of the variance, satisfies this criterion.

Analysis of Data

Eighteen curriculum components presently in use in the SIUC Aviation Management Program and fourteen CAA suggested aviation components were utilized as survey material to define educational requirements for a career in airline management. To determine and validate consensus towards inclusion of such items for a career in airline management, a second Delphi questionnaire was sent to airline presidents following analysis of the first survey.

Completion of the Delphi survey provides consensus relationships among different categories of curriculum. Based on standard deviation and mean observance, results fell into three distinct categories. These consisted of those statements having high consensus for inclusion as educational requirements for a career in airline management (Inclusionary Curriculum Statements), high consensus for not including subject matter (Exclusionary Curriculum Statements), and those where either support or lack of support was questionable (Uncertain/Diverse Curriculum Statements).

Analysis of Airline Respondent Rated SIUC Curriculum

Consensus Stability

Analysis of industry respondent mean stability indicated three curriculum statements with Survey 2 ratings identical to Survey 1 ratings. Those curriculum statements were Airport Management, Application of Technical Information and Aviation Labor Relations. The highest percentage change, Basic Air Traffic Control, experienced a shift of +10.50 %, while Current Issues in Aviation Management moved +7.32%.

Fourteen of the eighteen curriculum statements, or 77.78%, indicated increased Survey 2 means. Three (16.67%) experienced no change and only one (5.55%) indicated a decreased mean. The average percentage change for all curriculum statements from Survey 1 to Survey 2 was +2.97%. This aggregate percentage change, and each individual variation, were well within the predetermined 15% stability level. Thus, mean stability was achieved within the industry respondents. Table 1 indicates mean stability ratings for industry respondents.

Table 1
Airline Executive Mean Comparisons of SIUC Aviation Management Courses in Undergraduate Catalog

	Survey I	Survey II	%
Topic	Mean	Mean	Change
Airline Management	4.636	4.724	1.96%
Airport Management	3.364	3.364	0.00%
Airport Planning	2.545	2.455	3.54%
Application of Technical Info.	2.636	2.636	0.00%
Aviation Industry Regulations	4.273	4.364	2.13%
Aviation Labor Relations	4.455	4.455	0.00%
Aviation Maintenance Management	4.364	4.455	2.09%
Aviation Safety Management	4.182	4.273	2.18%
Basic Air Traffic Control	3.455	3.818	10.50%
Current Issues in Aviation Management	3.727	4.000	7.32%
Data Interpretation	3.909	4.000	2.33%
Fiscal Aspects of Aviation	4.091	4.273	4.45%
General Aviation Operations	2.019	2.107	0.77%
Internship	3.364	4.091	2.16%
Legal Aspects of Aviation	4.182	4.364	4.35%
National Airspace System	1.818	1.893	4.13%
Professional Development	2.818	2.909	3.23%
Work Center Management	3.909	4.000	2.33%

Analysis of industry respondents standard deviations, Table 2, indicates five curriculum statements with no standard deviation movement between Survey 1 and Survey 2. These were Airport Management, Airport Planning, Application of Technical Information, Aviation Labor Relations and National Airspace System. The largest change in standard deviation occurred with Fiscal Aspects of Aviation where a change of (-.316) was experienced. Other curriculum statements with large changes in standard deviation were Basic Air Traffic Control (-.285), Data Interpretation (-.258) and Legal Aspects of Aviation (-.246). The average standard deviation for the curriculum statements decreased from (.808) in Survey 1 to (.688) in Survey 2, a decrease of (-.120).

Table 2
Airline Executive Deviation Comparisons of SIUC Aviation Management Courses in Undergraduate Catalog

Topic	Survey I Std. Dev.	Survey II Std. Dev	Difference
Airline Management	0.751	0.647	-0.104
Airport Management	1.120	1.120	0.000
Airport Planning	0.688	0.688	0.000
Application of Technical Info.	0.809	0.809	0.000
Aviation Industry Regulations	0.604	0.505	-0.099
Aviation Labor Relations	0.522	0.522	0 000
Aviation Maintenance Management	0.674	0.522	-0.152
Aviation Safety Management	0.751	0.647	-0.104
Basic Air Traffic Control	1.036	0.751	0.285
Current Issues in Aviation Management	0.505	0.467	-0.038
Data Interpretation	1.044	0.786	-0.258
Fiscal Aspects of Aviation	1.221	0.905	-0.316
General Aviation Operations	0.701	0.536	-0.166
Internship	0.647	0.447	0.200
Legal Aspects of Aviation	0.751	0.505	0.246
National Airspace Systems	0.809	0.809	0.000
Professional Development	0.874	0.831	-0.043
Work Center Management	1.044	0.894	-0.150

Reduction in average standard deviation indicated stability of consensus. The combination of standard deviation reduction and less than a 15% change in survey means augers of stability of consensus among airline industry respondents.

Airline Executive Response Distribution

Table 3 denotes industry respondent Survey 2 rankings for each curricular statement by ranking ranges of: inclusionary, exclusionary and uncertain/diverse.

Table 3
Survey 2 Response Distribution of SIUC Aviation Curriculum

Exclusionary Curriculum Statements	Survey 2 Group Mean
Airport Planning	2.445
General Aviation Operations	2.107
National Airspace System	1.893
Uncertain/Diverse Curriculum Statements	**Survey 2 Group Mean**
Airport Management	3.364
Application of Technical Information	2.636
Basic Air Traffic Control	3.818
Professional Development	2.909
Inclusionary Curriculum Statements	**Survey 2 Group Mean**
Airline Management	4.727
Airline Internship	4.091
Aviation Safety Management	4.273
Aviation Industry Regulations	4.364
Aviation Maintenance Management	4.455
Aviation Labor Relations	4.455
Current Issues in Aviation Management	4.000
Data Interpretation	4.273
Fiscal Aspects of Aviation Management	4.273
Legal Aspects of Aviation	4.364
Work Center Management	4.000

Distribution of the airline executive responses related to SIUC curriculum is pyramidal, with more statements identified for inclusion as educational requirements for a career in airline management than for either exclusion or uncertainty. Of the eighteen curriculum statements, 61.11 % were ranked for inclusion, 16.67 % for exclusion and 22.22% fell within the uncertain category.

Analysis of Airline Industry Rated CAA Curriculum

Consensus Stability

Analysis of airline industry respondent mean stability indicated one curriculum statement, General Aviation Management, with Survey 2 ratings identical to Survey 1. The highest percentage change occurred in Air Transportation, experiencing a shift of +12.36 %. Other curriculum statements with high percentage changes were Aviation History (-0.53%), Marketing (+ 8.45%) and Accounting I (+8.00%).

Two of the eighteen curriculum statements, or 11.1 %, of data showed a lower mean. Fifteen Survey 2 responses (83.3%) increased their mean. The average percent change for all curriculum statements from Survey 1 to Survey 2 was +3.68 %, well within the predetermined 15% stability level. Thus, mean stability was achieved. Table 4 data shows mean stability ratings of airline respondents for CAA recommended aviation curriculum.

Table 4
Airline Mean Comparisons of CAA Guideline Curriculum

	Survey I	Survey II	%
Topic	Mean	Mean	Change
Accounting I	3.125	3.375	8.00%
Air Cargo Management	4.000	4.042	1.04%
Air Transportation	3.708	4.167	12.36%
Airport Management	2.125	2.000	-5.88%
Aviation History	1.583	1.417	-10.53%
Aviation Legislation	4.000	4.042	1.04%
Business Law	4.208	4.292	1.96%
Data Interpretation	3.125	3.333	6.67%
General Aviation Management	1.792	1.792	0.00%
International Aviation	4.417	4.583	3.77%
Macroeconomics	4.083	4.125	1.02%
Management I & II	3.125	3.208	2.67%
Marketing	2.950	3.206	8.45%
Microeconomics	4.375	4.500	2.88%

Analysis of airline industry responses related to CAA guideline curriculum standard deviation stability indicated two curriculum statements, Aviation History and General Aviation Management, with no standard deviation movement between Survey 1 and Survey 2. The largest change in standard deviation occurred with Accounting I curriculum statement, with a change of (-14.470). Other curriculum statements with large changes in standard deviation were International Aviation (-13.710), Management I & II (-13.430) and Data Interpretation (-9.27). Average standard deviations for all curriculum statements decreased from (.677) in Survey 1, to (.625) in Survey 2, a decrease of (.052). The data in Table 5 shows standard deviation stability ratings for airline industry respondents as they relate to CAA guideline curriculum.

Table 5

Airline Executive Standard Deviation Comparisons For CAA Curriculum

	Survey I	Survey II	
Topic	Std. Dev.	Std. Dev	Difference
Accounting I	0.881	0.753	-14.470
Air Cargo Management	0.577	0.538	-6.740
Air Transportation	0.676	0.624	-7.710
Airport Management	0.725	0.707	-2.510
Aviation History	0.493	0.493	0.000
Aviation Legislation	0.707	0.676	-4.440
Business Law	0.644	0.611	-5.150
Data Interpretation	0.881	0.799	-9.270
General Aviation Management	0.644	0.644	0.000
International Aviation	0.571	0.493	-13.710
Macroeconomics	0.493	0.439	-10.96
Management I & II	0.880	0.763	-13.430
Marketing	0.676	0.644	-4.670
Microeconomics	0.633	0.577	-8.830

As with the SIUC Aviation Management curriculum, reduction in average standard deviation indicated stability of consensus. Based on the combination of standard deviation reduction and less than 15% change in the means between Survey 1 and Survey 2, stability of consensus was affirmed.

Airline Industry Response Distribution

Table 6 indicates the airline industry respondent Survey 2 rankings for each curriculum statement by ranking range; inclusionary, exclusionary and uncertain/diverse.

Table 6
Survey 2 Response Distribution of CAA Guideline Curriculum

Exclusionary Curriculum Statements	Survey 2 Group Mean
Airport Management	2.000
Aviation History	1.416
General Aviation Management	1.791
Uncertain/Diverse Curriculum Statements	**Survey 2 Group Mean**
Accounting I	3.375
Data Interpretation	3.333
Management I & Ii	3.208
Marketing	3.206
Inclusionary Curriculum Statements	**Survey Group Mean**
Air Cargo Management	4.042
Air Transportation	4.167
Aviation Legislation	4.042
Business Law	4.292
International Aviation	4.583
Macroeconomics	4.125
Microeconomics	4.375

Distribution of the airline executive's responses related to CAA curriculum is also pyramidal. More statements were identified as necessary for a career in airline management than for either exclusion or uncertainty. Of the fourteen curriculum statements, 50.00 % fell in the inclusion category; 28.58 % fell in the uncertain category and 21.42% were selected for exclusion.

Conclusion

Based on Kaps (1995), response distribution indicating similar stability and consensus among like subject matter in areas of inclusion, exclusion and questionable curriculum content are valid comparisons. Therefore, rather than redirect this study's focus to the similarity of excluded and uncertain topics, only those capable of inclusion as educational requirements for a career in airline management are considered.

Table 7, below, indicates those curriculum statements demonstrating statistically stable inclusion consensus.

Table 7
SIUC & CAA Curriculum Inclusionary Ratings

SIUC Courses	Mean	CAA Recommended Courses	Mean
Airline Management	4.727	Air Cargo Management	4.042
Airline Internship	4.091	Air Transportation	4.167
Aviation Safety Management	4.273	Aviation Legislation	4.042
Aviation Industry Regulations	4.364	Business Law	4.292
Aviation Maintenance Management	4.455	International Aviation	4.583
Aviation Labor Relations	4.455	Macroeconomics	4.125
Current Issues in Aviation	4.000	Microeconomics	4.375
Management	4.273		
Data Interpretation	4.273		
Fiscal Aspects of Aviation	4.364		
Management	4.000		
Legal Aspects of Aviation			
Work Center Management			

Recommendations and Suggestions

Based on the emerging consensus related to SIUC's curriculum and CAA's suggested aviation content, educational institutions considering incorporation of an airline management component should consider the adoption of inclusionary curricular statements identified in this study. The educational requirements indicated in this study are unique and specific enough to warrant such consideration. These findings reflect the current needs of an industry in a constant state of flux. As education must mirror such change, adaptation to industry needs is essential.

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